AUTOMOTIVE INDUSTRIES

AUTOMOTIVE and AVIATION MANUFACTURING
ENGINEERING • PRODUCTION • MANAGEMENT

JANUARY 15, 1954

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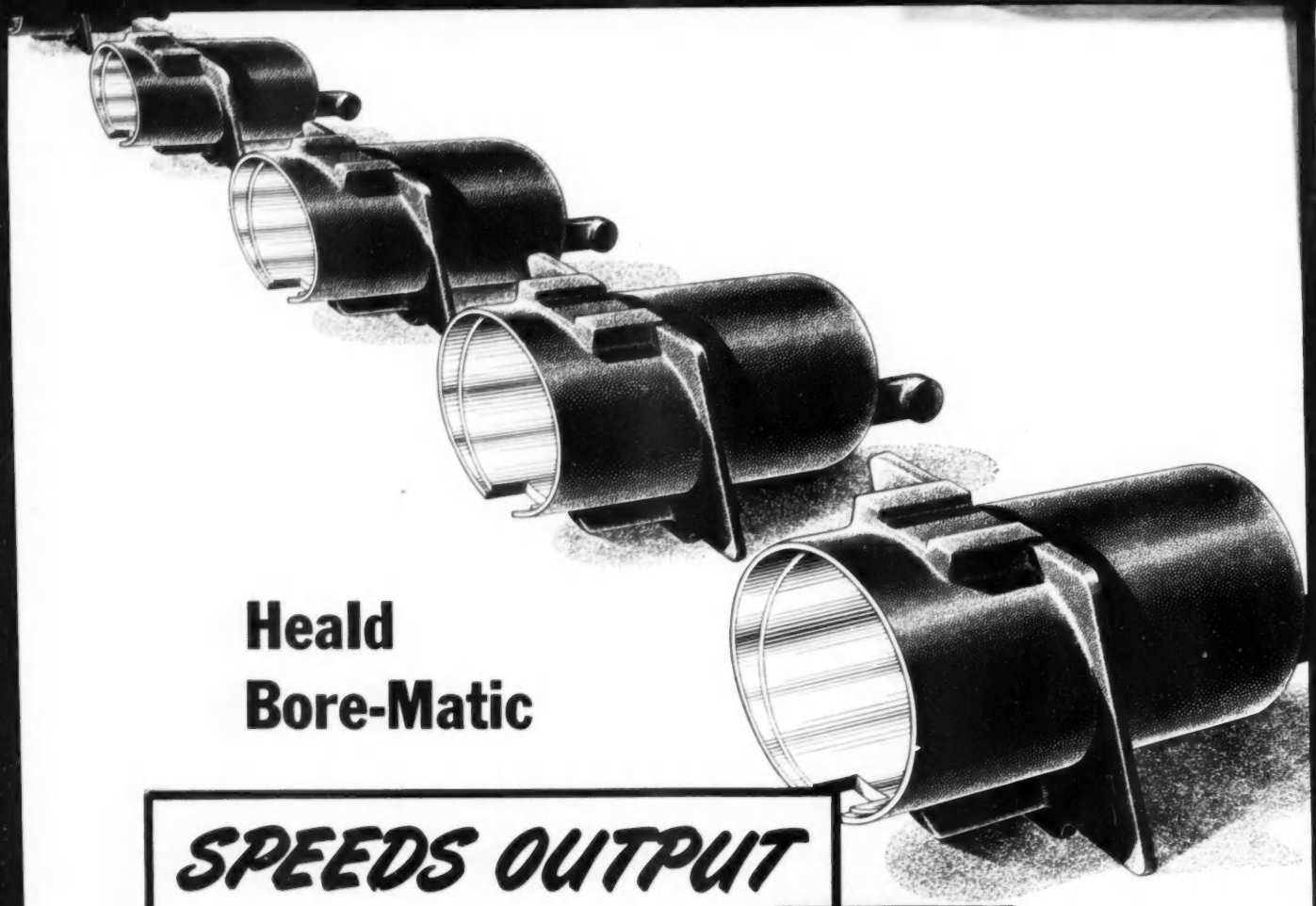


Heald Bore-Matic

SPEEDS OUTPUT of ironer cylinders 67%

• WHEN YOU COMBINE high cycle speeds, multiple boringheads and automatic indexing, you'll get faster, better production every time. The Heald Model 321 Bore-Matic shown at the left is a typical example.

By performing both roughing and finishing operations on two parts at a single loading, this machine speeded up the job by 67%. Three boringheads are used — the outer two for roughing the cast iron cylinders, and the center one for the finishing operation. A two station fixture on the cross slide indexes the work automatically. Parts are located in a Vee block fixture, with quick-acting clamps for easy loading and unloading.

Remember — when it comes to precision finishing, it pays to come to Heald.

Internal and Rotary Surface Grinding Machines and Bore-Matics

HEALD

THE HEALD MACHINE COMPANY

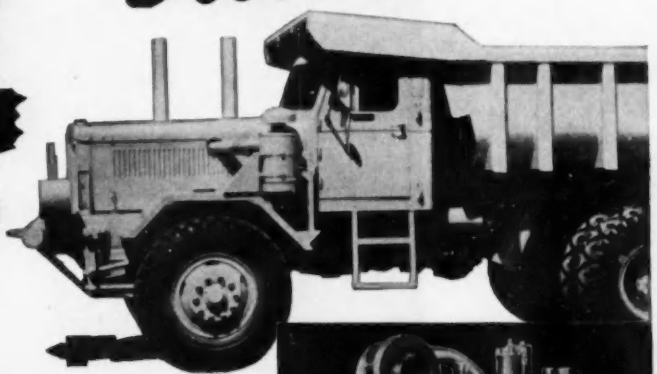
WORCESTER 6, MASSACHUSETTS

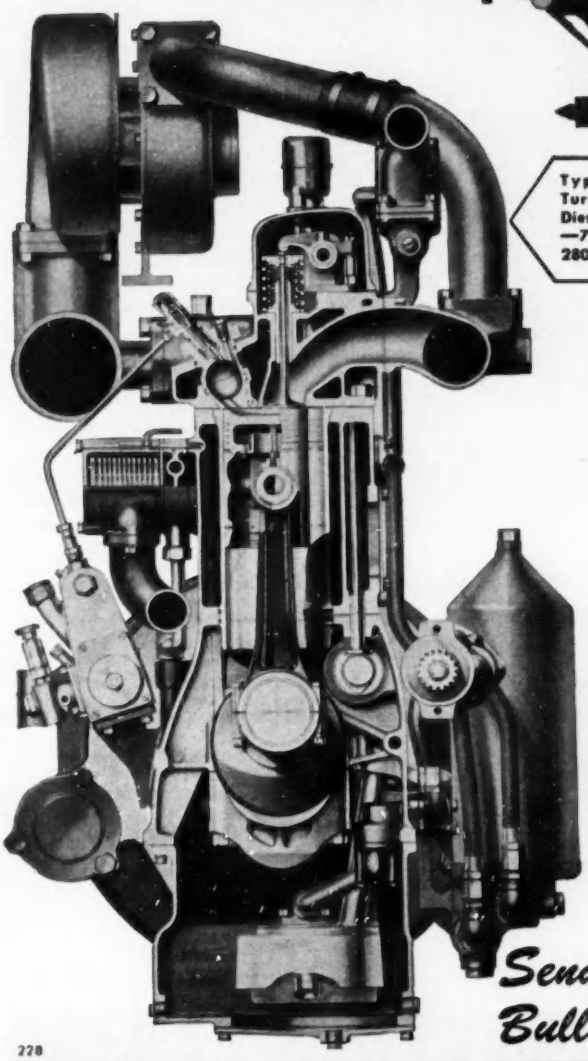
Offices in Chicago • Cleveland • Dayton • Detroit • Indianapolis • New York

THE PAYLOAD POWER PLANT

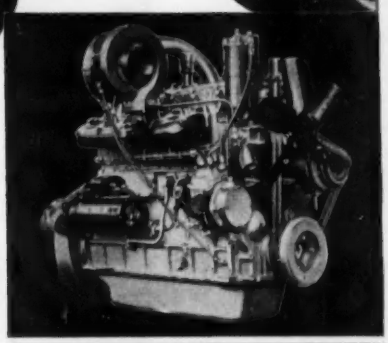
turbocharged WAUKESHA *Diesels*

150-352 hp

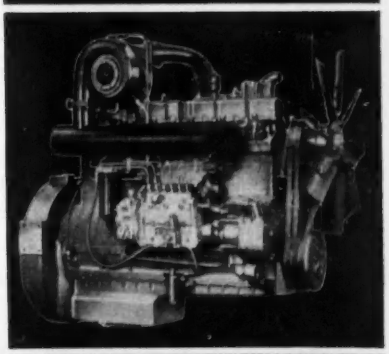




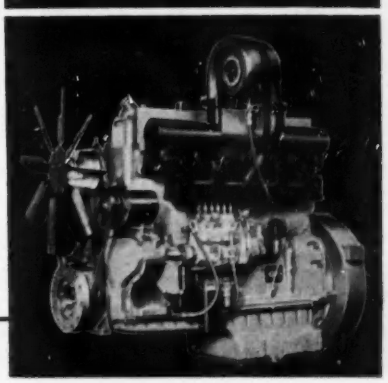
Typical Waukesha Turbocharged Truck Diesel Model 148-DKBS —779 cu. in. Max. hp 280 at 2100 rpm



135-DKBS
—4¼ x 5,
426 displ.,
185 hp



148-DKBS
—5¼ x 6,
779 displ.,
280 hp



WAKDS
—6¼ x 6½,
1197 displ.,
352 hp

Send for Bulletins

228

WAUKESHA MOTOR COMPANY, WAUKESHA, WIS.

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● At the Cleveland Engine Plant of the Ford Motor Company, both sides of wrist-pin and crank-pin bosses are accurately ground on a high production basis with this five wheel Mattison (Hanchett-Type) Vertical-Spindle Automatic Rotary Surface Grinder. Work pieces are held in automatic clamping fixtures. Automatic sizers are constantly in operation checking the work and keeping all pieces within specified tolerances without operator's attention.

This is only one of the many grinders made by Mattison. Whatever your surface grinding problems may be, write us for our recommendations on the proper method and machine for your job.

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A CHILTON MAGAZINE **AI** PUBLISHED SEMI-MONTHLY

AUTOMOTIVE INDUSTRIES

JANUARY 15, 1954 VOL. 110, NO. 2

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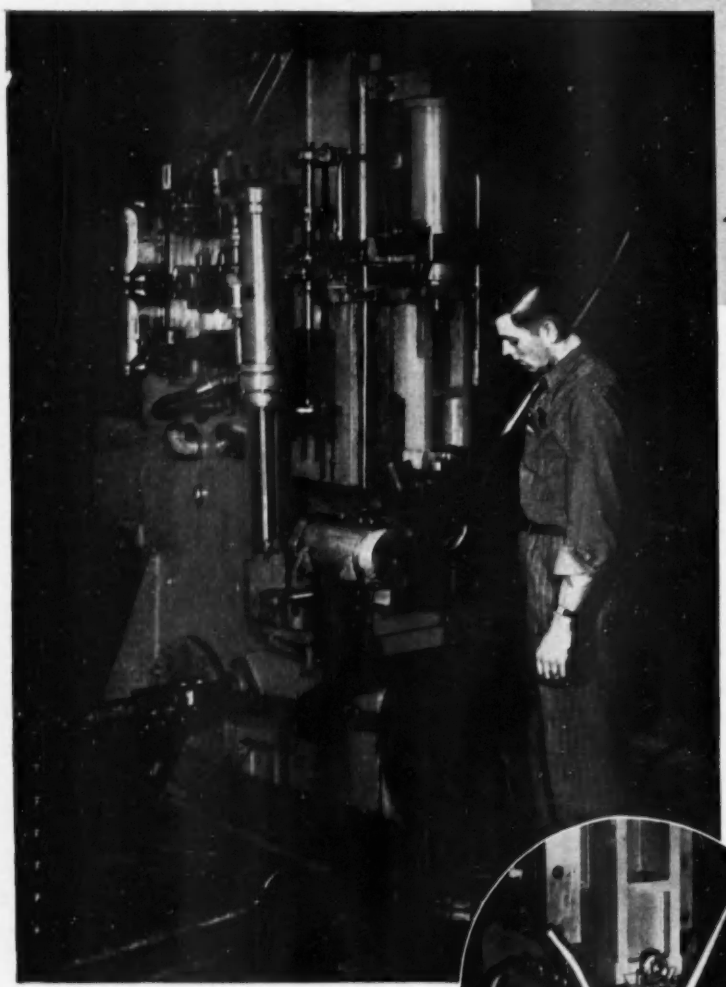
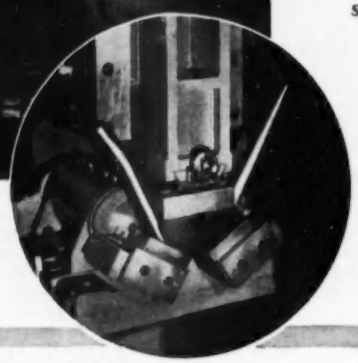
New PINES 20-TON BENDING PRESS

PRODUCES AUTOMOTIVE EXHAUST PIPES

50% FASTER



▲ Production view of new Hydraulic Bending Press now producing, in a single setup and with one operator, 4 to 8 multiple bends on automotive exhaust and tailpipes at speeds from 600 to 800 bends per hour.



◀ Closeup view of Pines Bending Press forming 4th bend in a 1⅝" (16 ga.) CRS automotive exhaust pipe. Note how wing dies are controlled by side-mounted cushions through heavy crank arms. Interchangeable pick-off turret of angle-of-bend selector saves set-up time on repeat jobs.

The new Pines 20-Ton Hydraulic Pipe and Tube Bending Press is now establishing new records of production efficiency on many different bending operations. For example, on automotive exhaust and tailpipes, multiple bends with 4" and 6" radii are now produced in 1-1/4" to 2" O.D. 16 ga.-18 ga. tubing at speeds ranging from 600 to over 800 bends per hour.

On an over-all basis, current results show these jobs are produced 50% faster than with ordinary bending press equipment. At the same time, because of the design of the Pines, savings up to 30% in setup time are effected. Further, because more jobs can be handled in a single setup, there's a substantial reduction in tooling expense. If you have work adaptable to a bending press, it will pay you to see Pines today.

CHECK THESE COST-CUTTING PRODUCTION FEATURES

- **Twin Equalizing Side-Mounted Cushions** — provide greater working clearance, maintain constant torque, reduce flattening and distortion.
- **Faster Cycling** — angle-of-bend selector indexes and resets to starting position automatically without indexing through idle stations, increases output.
- **Greater Work Handling Capacity** — extra clearance reduces number of setups on multiple bending, permits broader use of uniform radii, cuts tooling and production costs.
- **Interchangeable Pick-Off Turret** — for angle-of-bend control. Permits storing and remounting for repetitive jobs, reduces setup time.
- **Adjustable Ram Speed Control** — assures efficient operation, simplifies setups. Ram can be lowered slowly or stopped at any point.

WRITE FOR NEW 4-PAGE BULLETIN

Write today for free bulletin completely illustrating and describing the new Pines Bending Press and its cost-cutting production features.

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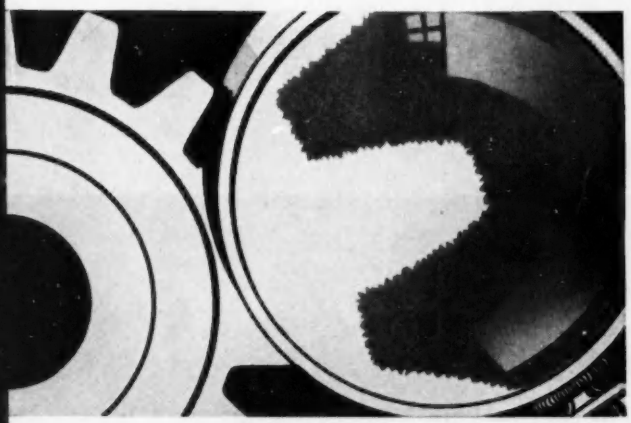
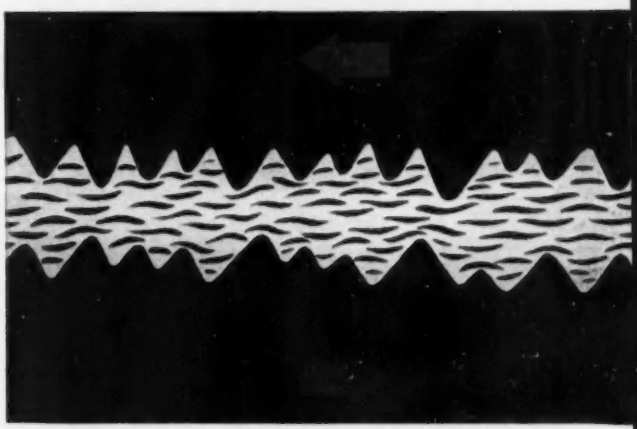
PRODUCTION BENDING • DEBURRING • CHAMFERING MACHINERY

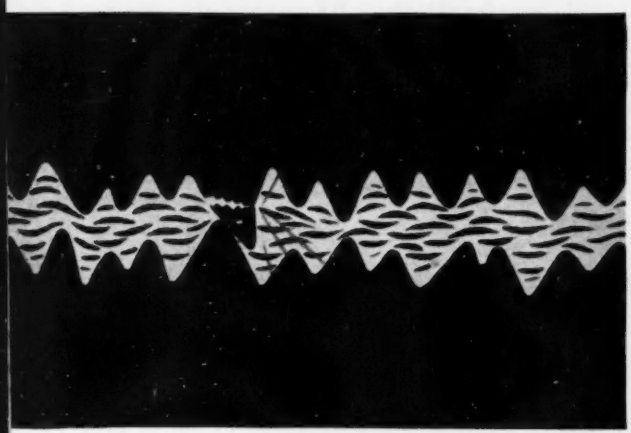
HOW SUNEP PREVENTS GEAR WEAR



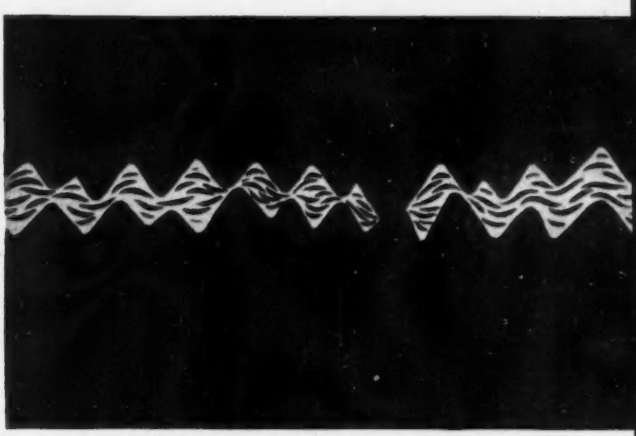
The surface of a gear may seem smooth, but when greatly magnified it looks something like this. The lubricant must keep these jagged edges apart.



With ordinary oil, a thick film is needed to keep these metal surfaces apart. The thickness of the film depends on the viscosity of the oil and other factors.



It is difficult to maintain a thick oil-film in everyday practice. The oil film thins out and semiboundary lubrication results. With ordinary oil, metal to metal contact occurs and gears wear.



Sunep coats the surfaces with a chemically bonded film which is virtually unbreakable. This film, although only about 0.0000001" thick, keeps the surfaces apart, withstands heavy loads and sudden shocks, prevents wear.

Sunep has many advantages. In addition to its outstanding load-carrying ability, it is noncorrosive; it keeps gears and bearings clean; it prevents rusting; it stays put. And its additives do not drop out during use or after prolonged storage. For more information about Sunep and how it protects your equipment, call your nearest Sun office or write SUN OIL COMPANY, Philadelphia 3, Pa., Dept. AA-1.

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production rate—gets the

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Leading chuck manufacturer uses Norton machines to cut grinding time in half

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That's why Jacobs' choice of Norton grinding machines is worth serious consideration when *you* are buying grinding machines.

In producing their famous Rubber-Flex Collets, for example, Jacobs reports that switching from separate operations to a single operation on Norton Type CTU Semiautomatics with multi-wheel mounts has doubled their production rate. *Jacobs reported similar production savings in grinding chuck bodies on the same type of Norton machines.*

Another manufacturer has boosted production from 300 to 600 parts per hour by grinding 2 diameters at once on a Norton machine. Still another reports that a Norton grinding machine with a triple-wheel mount has upped his production rate 128%. Throughout industry, manufacturers are using Norton grinders and lappers to provide the "Touch of Gold" that means time, work and money saved in grinding operations.

The "Touch of Gold" in Your Own Grinding

means the same profit-increasing advantages. And remember: only Norton offers you such long experience in both grinding wheels and machines to assure this "Touch of Gold" that helps you produce more at lower cost.

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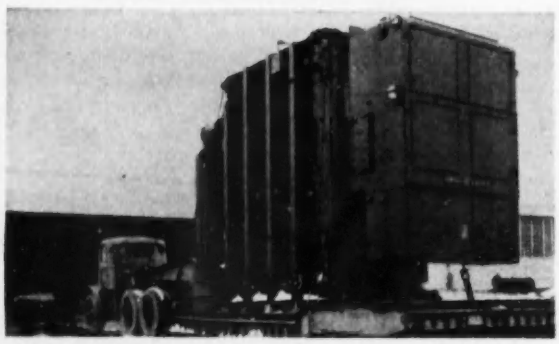
The "Touch of Gold" at Jacobs. One of the Norton 6" Type CTU Semiautomatic Grinding Machines used by The Jacobs Manufacturing Company of West Hartford, Connecticut, to grind metal inserts in the famous Rubber-Flex Collets. The basically fast action of this Norton grinder, the multi-wheel mount, special swivel table arrangement and wheel-truing device provide a single setup for traverse and shoulder grinding operations that boosts production rate 100%.

EASY TO SPECIFY AND INSTALL, G-E POWER DISTRIBUTION EQUIPMENT SERVES 1,000,000 SQ FT IN NEW ENGINE PLANT

"Packaged power" speeds Ford expansion



PRE-ENGINEERED to make system design easier, this 35,000-kva transformer is on its way to the plant substation. Use of two units increases dependability of power supply.

EQUIPMENT ARRIVES in unit form for fast installation, to conserve skilled manpower. Here, the switchgear section of a load-center unit substation is moved into position.

Pre-engineered components save months on design and installation of power system for new plant

When Ford Motor Co. built their new plant near Cleveland, the many automatic machines and processes made the planning, selection, and installation of the power distribution system one of the most important phases of plant construction.

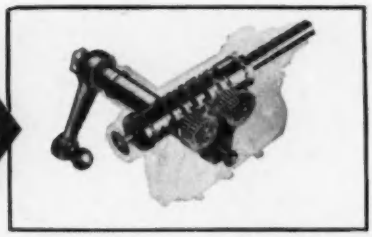
Ford, and Hatfield Electric Co., electrical contractors, saved months of engineering and installation time by selecting a power system made up of G-E equipment. Here's how: (1) co-ordinated systems are readily designed using pre-engineered G-E components, (2) "packaged" G-E equipment is quickly installed and connected, and (3) co-ordinated manufacture and shipment of system components saves time.

As in the Ford Cleveland plant, G-E power distribution equipment is being installed in the new assembly plants under construction at Milpitas, Calif., Louisville, Ky., and Mahwah, N. J. You, too, can save time and money on industrial plant electrification by specifying user-preferred G-E equipment. Contact your G-E apparatus Sales Office early in the planning stage of your next project. General Electric Co., Schenectady 5, N. Y. 651-4

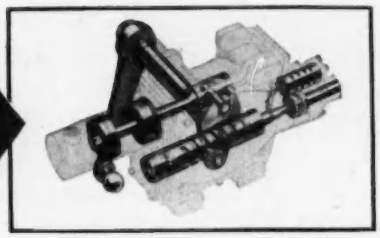
Engineered Electrical Systems for the Automotive Industry

GENERAL ELECTRIC

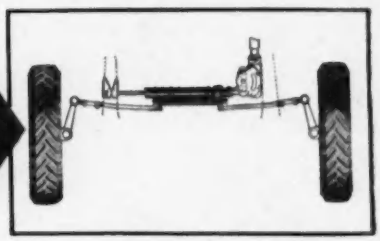
Cam & Lever MANUAL



Hydrapower INTEGRAL



Hydrapower LINKAGE



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Exclusive steering specialists since 1906, Ross provides a gear for *every* steering need—manual or power.

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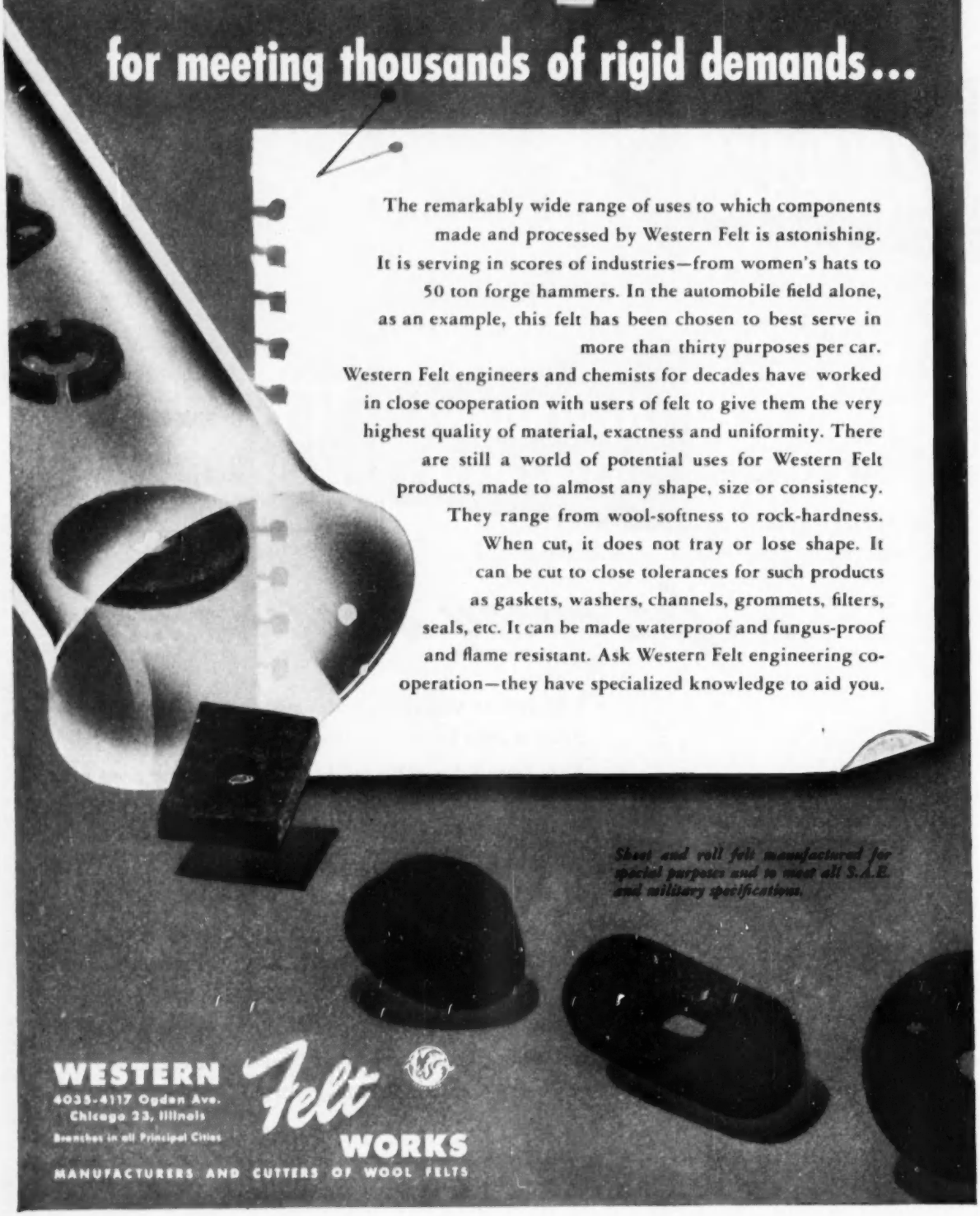
for meeting thousands of rigid demands...

The remarkably wide range of uses to which components made and processed by Western Felt is astonishing. It is serving in scores of industries—from women's hats to 50 ton forge hammers. In the automobile field alone, as an example, this felt has been chosen to best serve in more than thirty purposes per car. Western Felt engineers and chemists for decades have worked in close cooperation with users of felt to give them the very highest quality of material, exactness and uniformity. There are still a world of potential uses for Western Felt products, made to almost any shape, size or consistency. They range from wool-softness to rock-hardness. When cut, it does not tray or lose shape. It can be cut to close tolerances for such products as gaskets, washers, channels, grommets, filters, seals, etc. It can be made waterproof and fungus-proof and flame resistant. Ask Western Felt engineering co-operation—they have specialized knowledge to aid you.



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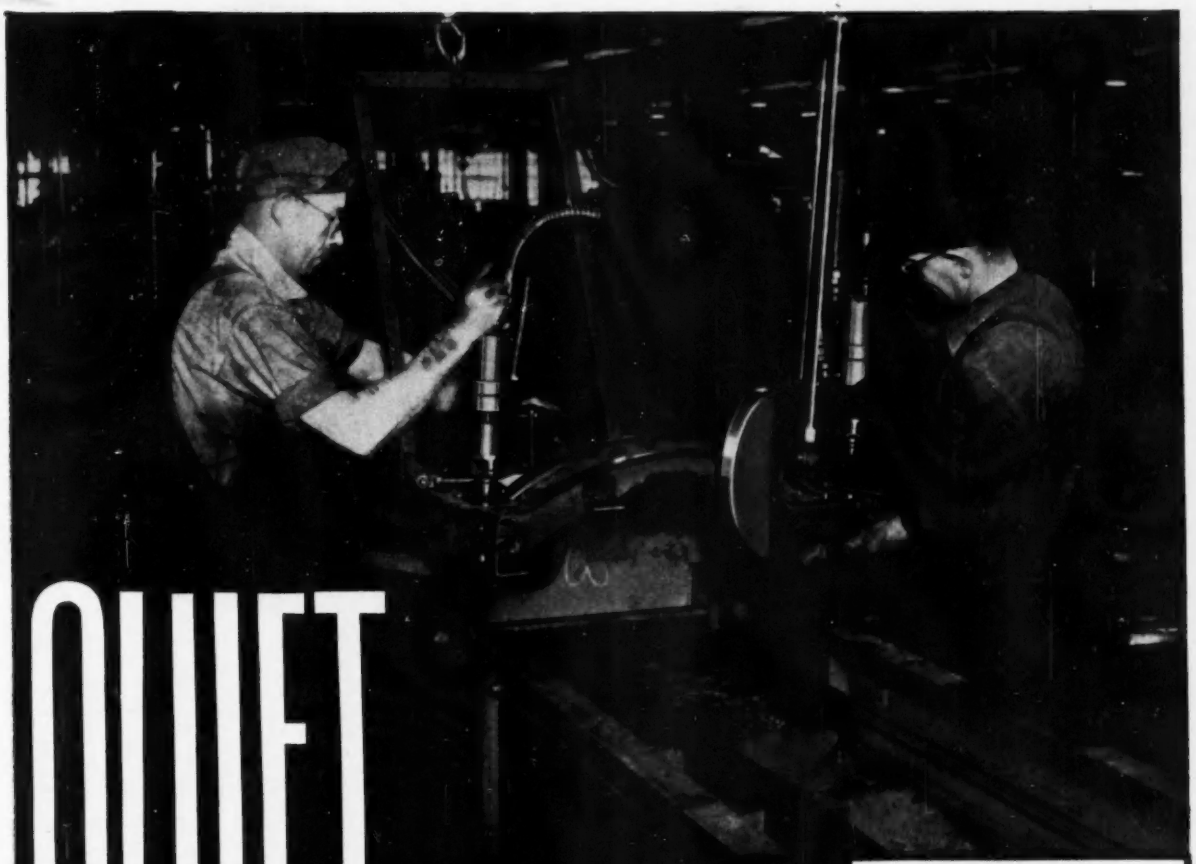


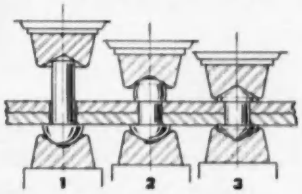
QUIET *riveters at work*

. . . not a sound as rivets are cold formed in 2½ seconds . . . each the exact counterpart of its neighbor... because Hannifin "Hy-Power" Riveters are at work.

These modern production tools, widely used in the highly competitive automotive industry to reduce costs and improve production, greatly simplify and speed up riveting. What's more, by riveting cold with this "silent squeeze" method, operators get a better, stronger riveted joint, every time. Hannifin "Hy-Power" portable and stationary yoke riveters are available in capacities from 7½ tons to 100 tons (more in multiple). Powered by the exclusive, patented "Hy-Power Hydraulic Generator, their quiet, automatic cycle is started with a touch of a button—yet, for safety, the stroke can be interrupted and the ram reversed at any point in the cycle, simply by releasing the control button.

If you rivet, stake, punch, press or bend, there's a place in your production picture for Hannifin "Hy-Power" equipment. Hannifin Field Engineers are located in leading industrial centers to advise you. Hannifin Corporation, 1143 S. Kilbourn Ave., Chicago 24, Illinois.

The quiet "Hy-Power" Hydraulic Work Cycle



Hydraulic pressure, under instant, reversible, finger-tip control, silently squeezes rivets in this manner:

1. Fast approach (completed)
2. Rivet being squeezed
3. Rivet formed; ram returns

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This bulletin tells the complete story of how Hannifin "Hy-Power" Hydraulic equipment can help you. Write today . . . a copy will be on its way tomorrow.

do ALL you can do . . . with

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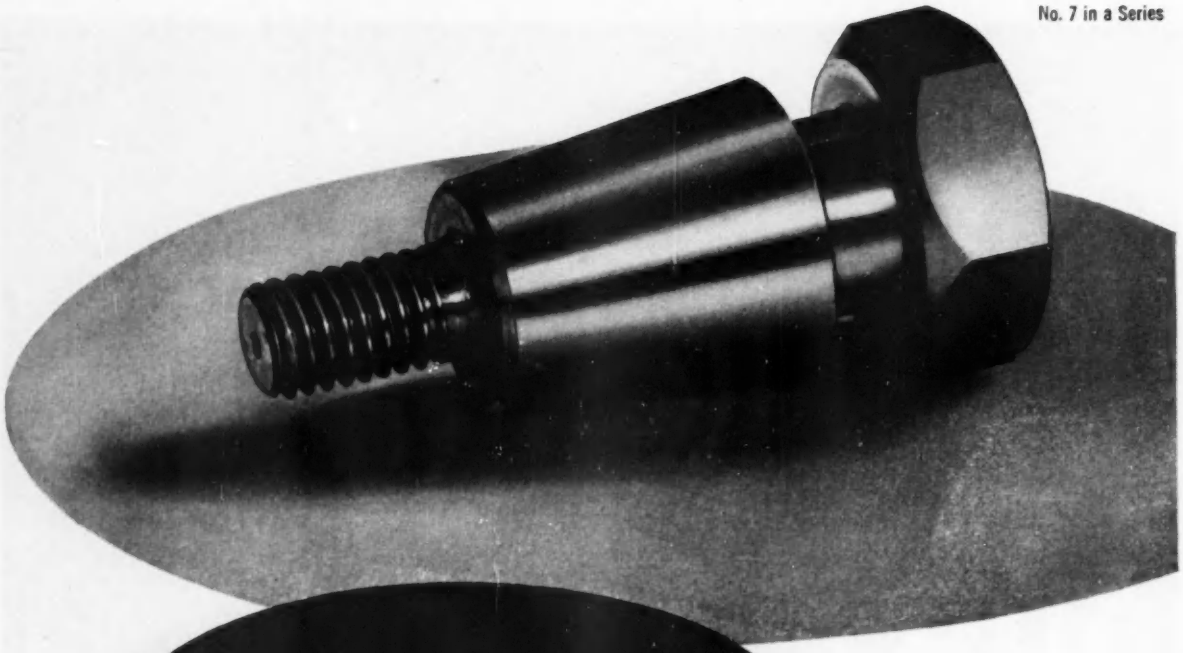
Air and Hydraulic Cylinders • Hydraulic Presses • Pneumatic Presses • "Hy-Power" Hydraulics • Air Control Valves

No. 7 in a Series



carbide service available

data for comparison

Part	Petcock Center
Machine	1⅜" Six Conomatic
Tools	100% Carbide Tipped
Material	X-1112
Stock Size	1" Hexagon
R. P. M.	1562
Time	8 seconds

Where conditions are favorable, 100% carbide tool-ups on "Automatics" make HSS tools appear as obsolete as ancient tools of carbon steel.

In determining the "favorable" conditions, the Conomatic Carbide Development is of real service to the "Automatic" user. Without risk of production loss or obligation of machine purchase, he gets an eye-witness demonstration of the profit possibilities of 100% carbide tooling to his own work.

Conomatic } CONE AUTOMATIC MACHINE COMPANY, INC. WINDSOR, VT., U.S.A.

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welded tubing may do it!

●With welded tubing you can cut weight without sacrificing strength. That's because —for a given strength in all directions—a tubular shape weighs less than *any other structural section.*

If you're interested in weight saving (and dollar saving), write Brainard Steel Division, Dept. W-1, Griswold Street, Warren, Ohio. An integrated producer; offices throughout the U. S.

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WELDED STEEL TUBING

Bendix Low Pedal Power Brake

one of the most popular new car features in years

Specified by More Car Manufacturers Than Any Other Make

Since the earliest days of the industry, car manufacturers have entered each model year with a host of new improvements that represent added value for the motoring public.

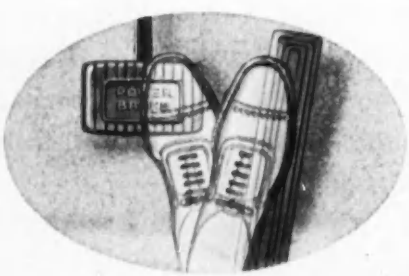
While all of these advancements have contributed to greater motoring enjoyment, the "new car features" that have basically altered previous motor car standards of performance are relatively few in number. For example, four-wheel brakes, a Bendix development, brought new safety to the highways; automatic transmissions materially increased driving ease; and today another great new feature, Bendix* Low Pedal Power Brake, is recognized as a revolutionary advancement in motor car control.

It is the only low pedal power brake that has met the test of millions of miles. In fact, Bendix Low Pedal Power Brake is specified by more manufacturers than any other make. It is the product of Bendix—world's largest producer of power brakes and leader in braking developments since the earliest days of the industry.

To make your line more popular it pays to equip with the performance proven Bendix Low Pedal Power Brake.

*REG. U.S. PAT. OFF.

NOW *Stopping* IS AS EASY AS *accelerating*



It is no longer necessary to lift the foot and exert leg power pressure to bring your car to a stop. With the Bendix Low Pedal Power Brake on about the same level as the accelerator, an easy ankle movement, much like working the accelerator, is all the physical effort required for braking. And by merely pivoting the foot on the heel, shifts from "go" to "stop" controls are made in far less time.

Result! MORE DRIVING COMFORT, LESS FATIGUE AND GREATER SAFETY

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High Spots of This Issue

★ **Oldsmobiles for 1954 Have New Bodies, Larger Engine**

The results of an extensive engine and chassis development program are apparent in this year's "Merry Oldsmobiles." A number of styling features, such as the wrap-around windshields, show the influence of the Starfire sports car. Page 34.

★ **General Motors Firebird Has Gas Turbine Engine**

Bound to delight the throngs attending the forthcoming GM Motorama in New York City will be the XP-21 Firebird experimental car. Powered by a 370-hp gas turbine engine, it looks like a cross between a torpedo and a jet plane. See page 42.

★ **General Purpose Machines Used to Produce Wright Engines**

The Chevrolet Aviation Engine Plant, Tonawanda, N. Y., has been humming during the past year turning out two models of Wright aircraft piston engines. The author describes the operations and the machines involved in the work. Page 44.

★ **Structural Plastics for Advanced Types of Aircraft**

In this meaty survey the writer reviews the extensive uses which have been found for plastics in aircraft and their respective advantages. Particular attention is given to analyses of various tests to which they have been put. Page 48.

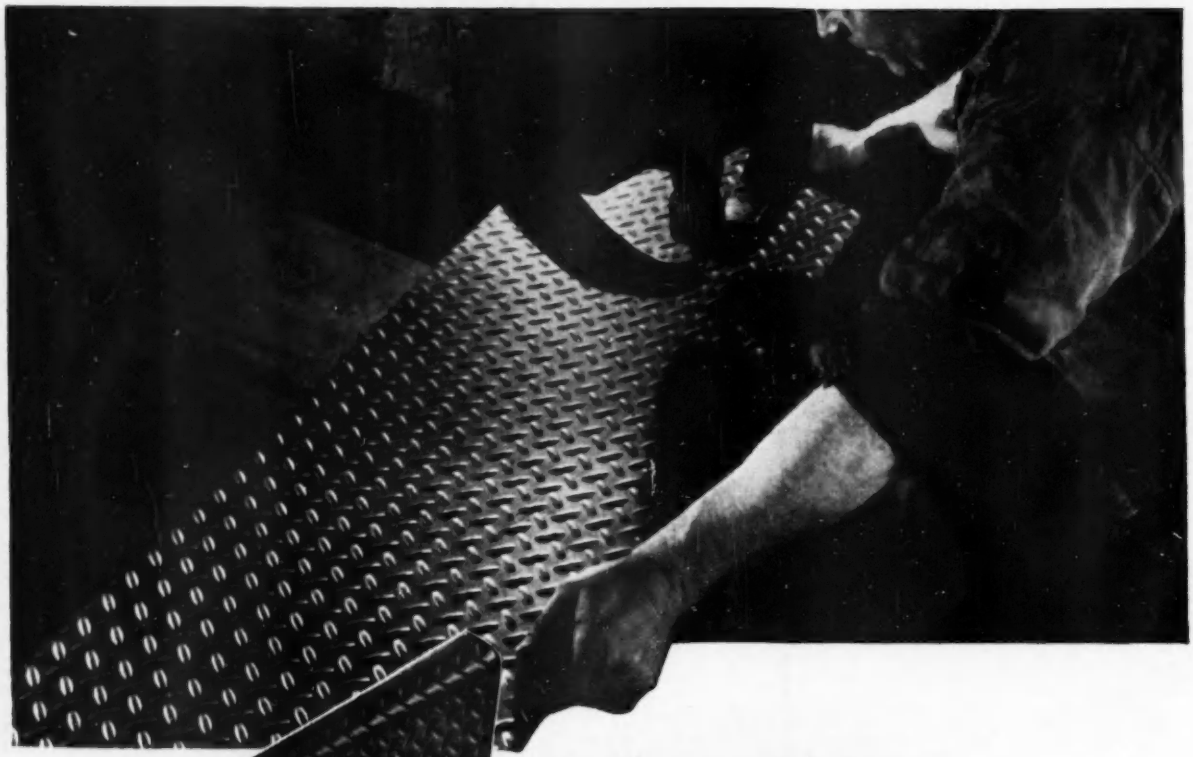
★ **Wide Range of Engines in Tractors at London Show**

The machines on display at the Agricultural Machinery Exhibition in Earl's Court indicated a number of trends. For example, there is a movement toward both the upper and lower ends of the power range and more use of Diesels. Page 54.

★ **34 New Product Items And Other High Spots, Such As:**

Automotive outlook for 1954; new press line for air cleaners; aviation prospects for 1954; industry previews and reviews; novel front axle for trucks, and causes of failures in ball thrust bearings.

Automotive and Aviation News, Page 17
Complete Table of Contents, Page 3



Safety Plate... Quick Delivery

The Famous Inland 4-Way Design

The next time you're looking for an answer to an under-foot problem where sure traction, easy maintenance and long wear are important, call Ryerson for Inland 4-Way Safety Plate.

The lugs in this attractive Inland pattern are hot rolled at right angles to each other to provide safe footing in all directions. There are no pockets where liquid or dirt can collect, so the surface is easy to drain and sweep.

This firesafe, long-lasting plate is available in two pattern sizes and a wide range of thicknesses. You can order it sheared, bent or punched to your specifications. Our stocks are complete—and we can assure you of immediate shipment.

PRINCIPAL PRODUCTS: CARBON, ALLOY & STAINLESS STEELS—BARS, STRUCTURALS, PLATES, SHEETS, TUBING, MACHINERY & TOOLS, ETC.

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JOSEPH T. RYERSON & SON, INC. PLANTS AT: NEW YORK • BOSTON • PHILADELPHIA • CINCINNATI • CLEVELAND • DETROIT PITTSBURGH • BUFFALO • CHICAGO • MILWAUKEE • ST. LOUIS • LOS ANGELES • SAN FRANCISCO • SPOKANE • SEATTLE

News of the AUTOMOTIVE AND AVIATION INDUSTRIES

Vol. 110, No. 2 January 15, 1954

Car Production Gets Off to Fast Start

Automobile production is starting off with a rush this year far ahead of January a year ago. General Motors and Ford, both with ambitious programs for the first quarter, are large factors in the heavy current production. Both the aforementioned manufacturers have just completed new model introductions and are gearing their output to meet current demand. They are also endeavoring to get dealers adequately stocked for the spring market.

Other companies who have had their 1954 models out longer are gearing production fairly well with current demand. They also, of course, are keeping an eye on dealer inventories to make sure that they are adequate for the spring season.

Willys Holders Get $14 Per Share Bid

Willys-Overland Motors, Inc., common stockholders who decide to withdraw their investment in the company have been offered an initial payment of $14 a share. They also would get a receipt entitling them to a *pro rata* share of remaining assets on final distribution of proceeds realized from sale of the company's physical assets to Kaiser Motors, Inc.

There still is a possibility that Willys-Overland might enter the investment business, but a determination of the company's future will not be made until it is known how many stockholders wish to retain their investment in the company. Ward M. Canaday, Willys chairman, announced last April that proceeds to stockholders resulting from the sale to Kaiser would approximate $17 a share. In his latest letter to stockholders he states there is no basis for changing the estimate.

Kaiser paid $32.792 million cash for the plant, plus assuming $28,267,445 of Willys' liabilities. Approximately $10.6 million of the purchase price was earmarked for retirement of Willys preferred stock and about $3.25 million set aside for contingencies, thus leaving approximately $47.5 million for distribution to owners of slightly more than 2.79 million common shares.

SCRAP LOADER

One of the latest applications of electronics in Chrysler manufacturing plants is the closed circuit television control equipment shown above in the Nine-Mile Press Plant. It permits the operator of the Logeman scrap balers to see clearly the loading of bales of steel scrap into gondola cars outside the building. The baler controls and television screen are in basement gallery, while the camera is mounted outside the building about 150 ft away from the baler.

Administration Building Built by Chambersburg

Chambersburg Engineering Co. is erecting a new administration building which will be occupied early in the year. The former office building, erected 71 years ago, has been razed

Nash N.K.I. Sports Car to Go on Sale in March

According to reports, Nash will introduce its small sports car (see AUTOMOTIVE INDUSTRIES, Oct. 15, 1952, p. 17, and March 15, 1953, p. 75) for sale in the U. S. in March. Known as the Nash-Kelvinator International (N.K.I.), it is a modified version of the N.X.I. experimental car. Said to stand four ft, five in. high, it weighs approximately 1600 lb. Maximum speed has not been disclosed.

Containing interchangeable American parts, the car will be a four-passenger model with jump seats in the rear and will be available in several colors, according to the company.

News of the AUTOMOTIVE

Briggs Completes Sale of Plants to Chrysler

Chrysler has consolidated the 12 plants, machinery, and equipment purchased from Briggs into a new unit to be called the Automotive Body Div. Ownership of the Briggs property passed to Chrysler Dec. 30 at a cost of $35 million. In addition, Chrysler will within 90 days pay for inventories held by Briggs at the time of sale, estimated at close to $40 million.

The Briggs purchase adds more than 6.5 million sq ft of plant space and 193.5 acres of land to Chrysler's holdings. More than 30,000 employes have been transferred to Chrysler payrolls in recent weeks.

Integration Trend

The purchase of Briggs by Chrysler is another example of the integration taking place in the industry, whereby manufacturers are producing their own automobile bodies and other components. All the bodies for Plymouth cars, which represent about half of Chrysler's production were purchased from Briggs and accounted for a major part of its business.

Since 1949 Chrysler Corp. has been moving in the direction of becoming more self-sufficient. That year it opened a press plant near Detroit for production of body stampings, and in 1950 it set up separate body assembly facilities at the De Soto plant. Last year the company opened body building facilities at the Dodge plant in San Leandro, Calif.

Organizational Set-Up

John E. Brennan has been named general manager of the new division. He had been in charge of the Chrysler jet engine plant near Detroit, and since August has also been on the executive staff of W. C. Newburg, Dodge president, and F. J. Lambert, vice-president and general manager.

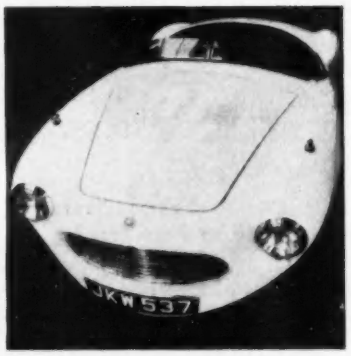
Six officials from Briggs will join the Chrysler organization. They include four vice-presidents: G. W. Drysdale, assistant to the Briggs president; C. B. Doty, engineering; J. D. Quinn, manufacturing; W. B. Connolly, personnel; D. J. Convery, treasurer; and D. B. Hinchman, secretary.

Details of Transaction

Completion of the transaction was delayed somewhat by a hitch which developed between Briggs and Boeing Aircraft Co. over assigning uncompleted defense contracts to Chrysler. Consequently, Briggs will retain the aircraft work in facilities leased back from Chrysler until costs can be redetermined, after which it is expected that the Boeing contract will be assigned to Chrysler.

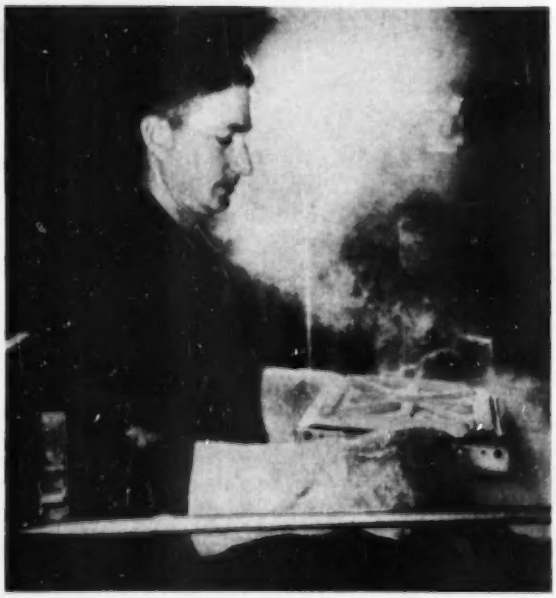
Of the $35 million received by Briggs, approximately $20 million is to be used to retire bank loans, after which stockholders will receive one or more partial payments pending receipt of the total amount involved in the transaction. Stock is to be retired as the cash distribution is made to stockholders on the same percentage basis that distribution of total disposable assets is made.

The new Automotive Body Div. will continue to provide Packard with bodies and Hudson with trim materials, at least for the time being. The purchase of Briggs by Chrysler, however, poses a serious problem for Packard, which had been buying all its bodies from Briggs. It is considered likely that the company is investigating the possibility of either getting another supplier or building its own body-making facilities.



SLEEK SPORTS CAR

The Jowett Co. exhibited this bug-like sports car, the "R-4," at the recent Earls Court Show in London. Overall length is 11 ft, seven in.; width is five ft. 2½; height is four ft, six in.; and top speed is over 100 mph. A special feature of interest on this model is an electrically-driven fan, said to be operable independently of the engine, which cuts in thermostatically when engine temperature requires its use.



SHELL MOLDING

Experimental work with shell molding procedures is carried on in a corner of the Carboloy foundry in the new GE Alnico magnet plant at Edmore, Mich. The operator is removing a pattern and half-section of the mold. Two sections, such as this one, make up the shell mold for producing a multiplicity of small Alnico castings in experimental production runs.

AND AVIATION INDUSTRIES

GM Broadens Market For Repair Parts

General Motors Corp. has put into effect a major change in its wholesale automotive replacement parts distribution plan. The new program, which went into effect Jan. 1, is designed to broaden the market for replacement parts manufactured by General Motors, particularly among independent automotive service establishments.

The three GM parts distribution groups—AC Spark Plug warehouse distributors, United Motors Service jobbers, and car and truck dealers wholesaling parts—all will have available for the independent replacement parts trade GM-manufactured parts that previously were distributed by one of these three groups. It is important to note that not all replacement parts will be carried, but only a line of fast-moving, competitive items which, it is understood, includes water pumps, transmission parts, grilles, and similar items.

Plymouth Car Output Hit Peak Last Year

Plymouth was the only large-volume car manufacturer last year to have its highest production year in history. Production in 1953 totaled 661,318 cars, a substantial margin over the previous high of 623,031 built in 1951, when a strike halted production for several weeks.

Seiberling Sets Up New Plastics Div.

Seiberling Rubber Co. has announced the formation of a new plastics division that is already in production on a pilot plant basis. Seiberling will concentrate initially on the fabrication of rigid plastic material with special properties of tensile strength, chemical resistance, or other desirable characteristics.

This material, produced in sheet form, then will be resold to manufacturers for conversion into special products. The company also will fabricate some finished products not in competition with its customers.

The Seiberling Plastics Div. will occupy a new plant at Newcomerstown, O., which is expected to be in operation about midsummer. The plant contract was announced previously (see AUTOMOTIVE INDUSTRIES, Jan. 1, p. 98).

ACCELERATOR FOR TRAILER RAIL TRAVEL

Designed to facilitate the loading and unloading of highway trailers from flat cars is a portable magnesium ramp developed by Magnesium Co. of America and Brandon Equipment Co. Said to be the largest single unit ever fabricated from magnesium, the ramp is 45 ft long and nine ft wide, although it flares to 11 ft at the ground level to permit easy approaches and turns by the trailers. It weighs 4800 lb and is raised or lowered by means of a manually operated hydraulic system.

Fisher Body Lists Farm Products Used

Fisher Body Div. of General Motors Corp. has compiled some interesting figures on its use of agricultural products in building 2.9 million automobile bodies last year. More than 22 square miles of textiles were used in upholstery. Included were 9.5 million lb of finished wool, the product of more than 3.9 million sheep.

Cotton also was used liberally, accounting for more than 18.7 million pounds. Even though leather is not commonly thought of as a large element in automobile upholstery, Fisher last year used more than 17.7 million sq ft. The division's statisticians have figured out this would hold up the pants of all men in the states east of the Mississippi if made into belts, with enough left over for all the men in Texas and Oklahoma.

Olds Hold Price Line on Its 1954 Models

Basic prices of 1954 Oldsmobile models will remain the same as in 1953. List price of power steering has been reduced to $125.00.

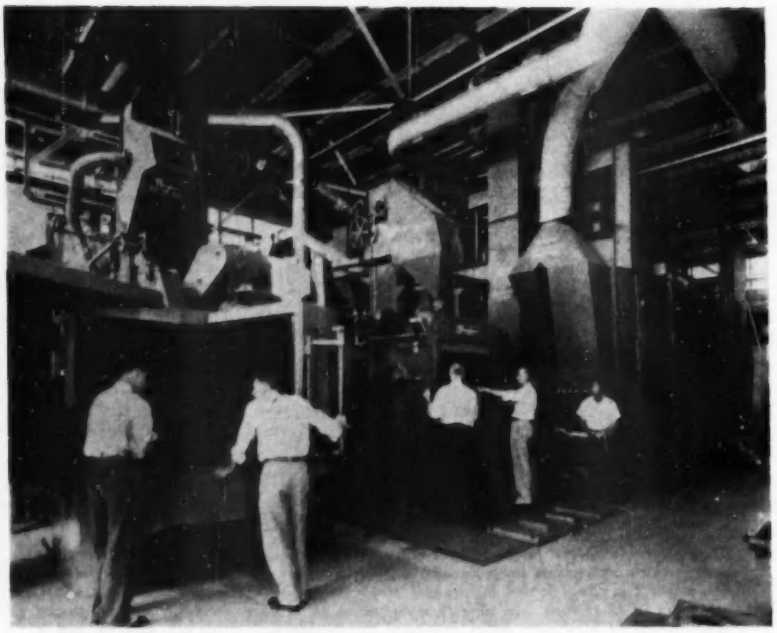
List prices of the 1954 Oldsmobiles are as follows:

Series "88"	
Four-door sedan	$2126.09
Two-door sedan	2065.62
Holiday coupe	2230.00
Super "88"	
Four-door sedan	2251.71
Two-door sedan	2189.25
Holiday coupe	2448.39
Convertible coupe	2614.59
Series "98"	
Four-door sedan	2551.82
Deluxe Holiday coupe	2770.75
Starfire	2962.84
Holiday coupe	2370.00

Carboloy Adds Three New Field Districts

Three new field districts have been organized by Carboloy Dept. of General Electric Co. The newly organized districts are: Allegheny, Pittsburgh; South Central, St. Louis; and New England, Boston.

News of the AUTOMOTIVE



CLEANING AND DUST CONTROL CENTER

Set up to solve blast cleaning and dust control problems in short order, the Demonstration Room at Pangborn Corp. recently had several important additions to its extensive array of equipment. Heading the group is a Rotoblast Blastmaster Barrel, which has been developed by Pangborn for batch blasting of castings and is produced in sizes ranging from three to 27 cu ft capacity. Another notable new piece of equipment is a full-sized steel sheet blasting machine capable of handling steel sheets up to 54-in. width which will clean in excess of 200 sq ft of surface per minute.

1953 PASSENGER CAR PRODUCTION

(As reported by the car factories)

	December 1953	November 1953	December 1952	Twelve Months 1953	Twelve Months 1952
Chrysler	11,177	11,420	17,828	160,410	120,678
De Soto	10,648	11,187	12,907	129,983	97,556
Dodge	13,526	20,260	37,735	293,714	259,519
Plymouth	49,140	48,205	64,916	662,515	474,837
Total—Chrysler Group	84,491	91,092	133,386	1,246,622	952,592
Ford	61,731	110,961	91,984	1,184,187	777,731
Lincoln	4,362	2,405	3,131	41,962	31,992
Mercury	30,875	19,431	23,120	320,369	195,261
Total—Ford Group	96,968	132,797	118,245	1,546,518	1,004,984
Buick	13,921	17,606	19,780	465,353	321,048
Cadillac	3,746	10,050	6,128	103,536	96,844
Chevrolet	126,051	37,219	46,869	1,477,299	877,950
Oldsmobile	9,966	24,961	15,105	319,414	228,452
Pontiac	33,268	18,466	28,238	414,011	277,156
Total—G. M. Group	188,952	108,301	116,120	2,799,615	1,801,450
Henry J and Kaiser	147	1,141	6,092	21,092	74,862
Willys	None	None	5,186	40,186	50,836
Total—Kaiser Group	147	1,141	13,278	61,278	125,698
Hudson	3,490	5,258	6,546	76,331	76,348
Nash	6,631	6,633	14,534	134,486	152,141
Packard	5,321	752	9,099	61,298	62,876
Studebaker	9,797	13,812	9,098	186,484	161,520
Total—All Makes	395,997	361,787	420,276	6,132,632	4,337,611

Union Hints Approach To Annual Wage Plan

Little is known about details of guaranteed annual wage plans which will be presented to the automobile industry by the UAW-CIO in 1955. However, some of the arguments to be advanced by the union to counteract employers' protests over cost of the plan are revealed in a recent union statement.

Nat Wineberg, UAW-CIO research director, in attacking a U. S. Chamber of Commerce pamphlet, called "The Economics of the Guaranteed Wage," states that under the UAW proposal it is not proper to assume that employers' costs will be equal to the maximum potential liability. He cited four separate means whereby employers acting individually and collectively will be able to hold costs substantially below the maximum liability level.

Mr. Wineberg went on to say that employers could do this by stabilizing employment in individual plants to the greatest possible extent within their own power; by aiding efforts to improve unemployment compensation benefits, benefit duration, and disqualification provisions; by cooperating and establishing a sound system of reinsurance designed to reduce the required size of guaranteed wage reserves by spreading risks of cyclical and other types of unemployment beyond management control as widely as possible, and by supporting national policies to maintain full employment.

As the year progresses, more and more is going to be heard about the guaranteed annual wage which will be the big issue when five-year contracts are opened in 1955. Automobile companies are gathering considerable data on such plans, but, until the union makes its demands known, there is little basis for speculating on whether or not the guaranteed annual wage will come in 1955.

New Fram Building

Ground-clearing has been started on the eight-acre site of a new Fram Corp. headquarters building in East Providence, R. I. Construction will begin early in 1954.

AND AVIATION INDUSTRIES

New Olds Styling Out Year Early

Evidence that competition is very much back in force this year is the revelation by Oldsmobile that the completely new bodies it is announcing this month on 1954 models (see page 34 of this issue) originally had been scheduled for 1955.

J. F. Wolfram, Oldsmobile general manager, did not elaborate on what originally had been planned for 1954, but the assumption is that it was pretty much the same as the division had in 1953. He also did not state the reason for moving the models up a year, but, obviously, the increased competition shaping up in the industry many months ago accounted for the change in plans.

Mr. Wolfram pointed out that some unusual engineering and production tooling effort was required to get the newly styled models into production. Fiber glass pilot models were rushed to completion, and considerable overtime work in Oldsmobile and outside tool and die shops was required to meet the new model deadline.

Ford Doubles Top Suggestion Award

Ford is increasing the maximum award under its employee suggestion program to $3000 from $1500. The minimum award also has been increased from $5 to $20. Since the program was started six years ago, 38,000 awards have been made, totaling nearly $2 million. Of this number, 163 have been for the $1500 maximum.

Cadillac Near Record Despite Fire Damage

Apparently all that prevented Cadillac from building more cars last year than in any year in its history was the Detroit Transmission Div. first last Aug. 12. Even with production seriously hampered for a while due to the lack of Hydra-Matic transmissions, Cadillac came within 700 cars of its all-time high established for the 1951 model year. The division completed its 1953 model year run with a total of 109,657 cars.

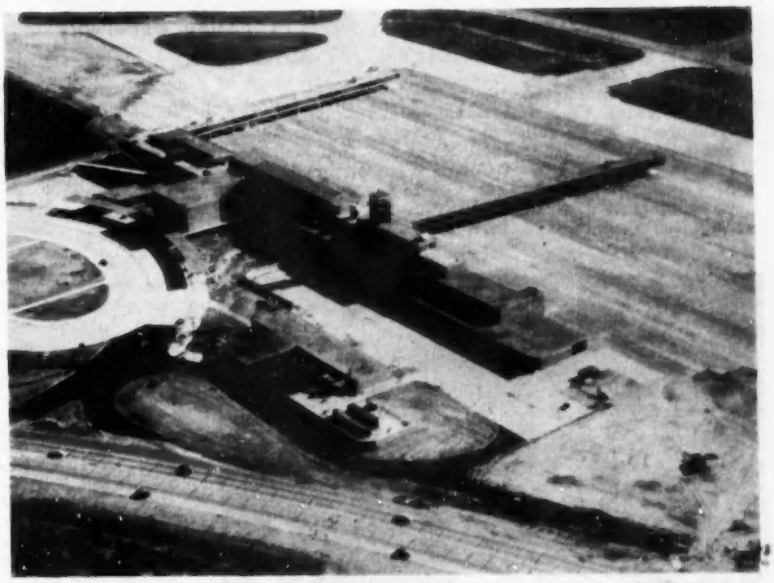
1953 MOTOR VEHICLE FACTORY SALES*

	Passenger Cars	Trucks	Buses	Totals 1953	Totals 1952
January	453,319	111,599	254	565,172	378,410
February	486,071	96,740	190	583,001	435,216
March	566,320	134,129	236	700,685	462,973
April	596,633	126,754	145	723,532	529,685
May	549,677	93,443	367	643,487	503,917
June	587,549	74,063	380	661,992	518,710
July	599,134	105,622	376	705,132	211,782
August	513,467	101,478	447	615,392	270,982
September	475,289	98,051	348	573,688	551,189
October	528,088	91,981	519	620,588	604,261
November	378,406	73,710	371	452,487	519,536
Total Eleven Months	5,733,943	1,107,570	3,633	6,845,148	5,003,531

1953 MOTOR TRUCK FACTORY SALES BY G.V.W.*

	5,000 lb. and less	5,001-10,000	10,001-14,000	14,001-16,000	16,001-19,500	19,501-26,000	Over 26,000	Total
January	53,077	21,481	4,067	16,333	3,950	8,766	3,905	111,599
February	45,121	18,279	3,413	13,305	4,267	8,255	4,060	96,740
March	59,951	25,153	6,159	22,962	5,618	9,503	4,783	134,129
April	55,652	25,680	5,770	21,006	5,187	8,856	4,604	126,754
May	43,812	16,293	3,560	13,379	4,823	7,900	3,656	93,443
June	33,297	11,628	2,169	10,102	4,549	8,217	4,101	74,063
July	51,316	18,697	4,220	15,766	4,231	7,635	3,753	105,622
August	47,884	18,611	4,241	15,599	3,850	6,930	4,363	101,478
September	49,159	18,000	3,610	14,390	3,508	5,163	4,221	98,051
October	44,951	17,658	3,355	13,513	3,693	4,462	4,349	91,981
November	35,187	12,524	2,851	12,192	3,444	4,899	3,613	73,710
Total—11 Mos.—1953	519,409	204,004	43,455	168,548	46,140	80,586	45,425	1,107,570
Total—11 Mos.—1952	448,288	212,102	52,042	202,386	42,992	96,536	42,230	1,096,576

* Automobile Manufacturers Association.



AIRPORT WONDERLAND

Representing in layout, construction, and decor a modernity that is a fitting tribute to the next 50 years of powered flight, the new Philadelphia airport was dedicated recently. Costing in the neighborhood of $15 million, the facility now has 600 acres dedicated to actual operations out of a total area of 2400 acres. Provision has been made for doubling, if necessary, the capacity of the 1500-car parking lot now available.

News of the AUTOMOTIVE

Littlewood New SAE Head; Bachman Remains Treasurer

William Littlewood, vice-president for engineering of American Airlines, Inc., was elected 1954 president of the Society of Automotive Engineers during the organization's annual meeting in Detroit, Jan. 11-15. He succeeds Robert Cass of White Motor Co. who served during 1953.

Election of 12 vice-presidents, a treasurer, and six members of the SAE Council also was announced. The new SAE vice-presidents are:

Air Transport, R. W. Rummel, Trans World Airlines, Inc.; Aircraft, F. W. Fink, Consolidated-Vultee Aircraft Corp.; Aircraft Powerplant, G. W. Newton, ARO, Inc.; Body, G. M. Buehrig, Ford Motor Co.; Diesel Engine, John Dickson, Detroit Diesel Div., General Motors Corp.; Engineering Materials, A. L. Boegehold, General Motors Corp.; Fuels & Lubricants, Kenneth Boldt, The Pure Oil Co.; Passenger Car, Harold Nutt, Borg & Beck Div., Borg-Warner Corp.; Production, E. D. Kemble, General Electric Co.; Tractor & Farm Machinery, H. L. Brock, Tractor Div., Ford Motor Co.; Transportation & Maintenance, H. L. Willett, Jr., Willett Truck Leasing Co.; and Truck & Bus, R. C. Wallace, Diamond T Motor Car Co.

B. B. Bachman, Autocar Div., White Motor Co., was re-elected treasurer. The following were elected to the SAE Council: C. A. Chayne, General Motors Corp.; W. S. Cowell, Wheel & Rim Co. of Canada, Ltd.; J. L. S. Snead, Consolidated Freightways, Inc.; W. C. Heath, Solar Aircraft Co.; J. G. Holmstrom, Kenworth Motor Truck Corp.; and F. G. Shoemaker, Detroit Diesel Engine Div., General Motors Corp.

FIAT FAST TOURER

The good reception accorded its 1100 model induced Fiat to introduce the new 1100 T.V. (turismo veloce) (fast tourer). It has a more powerful engine than its predecessor with an output of about 50 bhp at 5200 rpm and a top speed close to 80 mph. The four-cyl engine has a cast-iron cylinder block and an aluminum head.

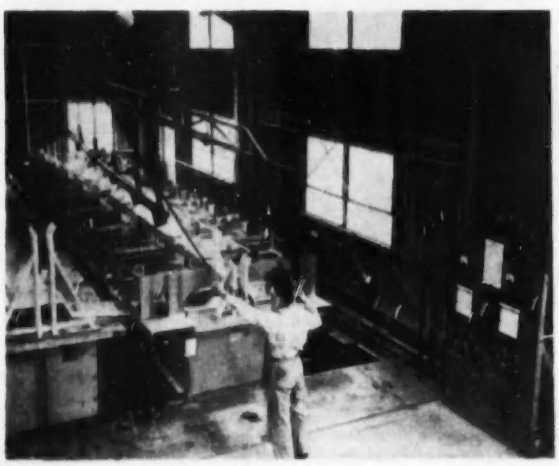
Standard Steel Plant Expansion Underway

Construction of a major addition to the plant of Standard Steel Spring Div. of Rockwell Spring and Axle Co. in Los Angeles has begun. The addition will comprise 81,000 sq ft and will equip the Los Angeles operation with a total of 190,000 sq ft of manufacturing area.

Maremont Acquires Pratt Industries

Maremont Automotive Products, Inc., has acquired all the outstanding common stock of Pratt Industries, Inc., manufacturer of exhaust system parts. Pratt manufacturing facilities, now located at Frankfort, N. Y., will be moved to Maremont's Harvey, Ill., plant.

Headquarters now located in New York City will be transferred to the Maremont executive offices in Chicago. Pratt will be operated as a division of Maremont.



SALT-BATHED ROTOR SPAR

Martempering of a helicopter rotor spar takes place in Ajax electric salt bath furnaces at Piasecki Helicopter Corp. Operator is guiding spar into 330-kw high-heat furnace, from which it is quenched into a 150-kw salt bath furnace quickly.

Czech Diesel for Cars Said to be Developed

Czechoslovakia is reported to have developed a prototype Diesel version of the four-cyl Tatraplan automobile engine.

The standard gasoline unit has a piston displacement of 119 cu in. with bore and stroke both 3.4 in. Rating is 52 bhp at 4000 rpm. It is rear-mounted and cooled by forced air.

The conversion to oil was made at the Tatra works at Koprivnice. According to reports of tests conducted there, fuel consumption is 34 mpg, and maximum speed of the medium-weight sedan is 72 mph.

AND AVIATION INDUSTRIES

Ford 1953 Production Close to 1950 High

Despite restrictions on production in the early part of last year and several crippling strikes in supplier plants during the first half, Ford came very close to equaling its postwar record production established in 1950.

In a year-end statement, E. R. Breech, executive vice-president, reports that Ford built 1.87 million cars and trucks last year, only 33,000 short of the 1950 total. Passenger car production was even closer, totaling 1.55 million units, only 7000 under the record postwar production year of 1950.

Ford also increased its market penetration last year, in ending 1953 with 24.9 per cent of total sales. This was nearly one per cent above the previous postwar record set in 1950, and 2.1 per cent above the year previous.

The sale of defense products last year amounted to more than $625 million, six times higher than for 1952. Some of the company's defense work was concluded in 1953, and other contracts will run out in 1954. Ford still has some defense work, however, that will continue for an indefinite period.

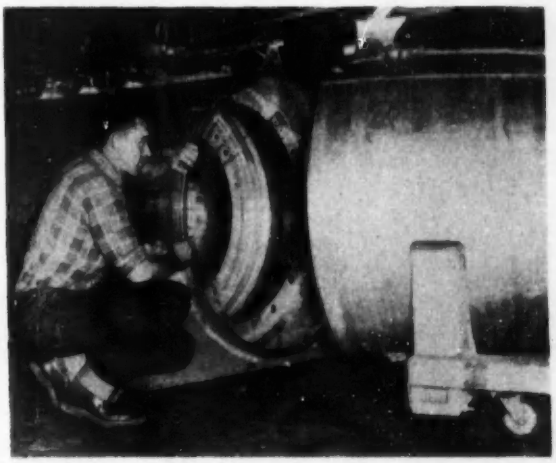
Last year, Ford completed 12 major construction projects in its postwar expansion program. The company, however, started on 15 other construction projects, most of which are due for completion this year.

Dynamatic Corp Made Division of Eaton

Dynamatic Corp. of Kenosha, Wis., operated as a subsidiary of Eaton Manufacturing Co. since 1946, has now become a division of Eaton. Its operations will continue with F. L. Hopf as general manager, E. H. Frederick as assistant general manager and T. R. LaVallee as sales manager. Dynamatic produces electro-magnetic equipment such as dynamometers, crane brakes, adjustable speed couplings, press drives, shovel and lift truck clutches, and similar products.

BIG TANKS

An inspector at Ryan Aeronautical Co. checks a joint of one of the huge fuel tanks which Ryan designed and is currently building for the B-47 jet bomber. The tanks are built in sections which can be nested to save storage and shipping space. Elastic Stop nuts are used in gang nut channels to reduce time and labor requirements for fabrication and assembly.



No Drastic Changes Seen in Taft-Hartley in 1954

Heavy pressure is to be applied at the current session of Congress to bring about broad changes in the Taft-Hartley Act. Some of the proposals will be seriously considered, but it is not likely that any major changes will be made this year.

Most congressmen agree that some revision is needed. As it now stands, however, most legislators will incline to the position that the law is working very well generally and can point to the 1953 record of labor-management disputes as strong evidence.

Preliminary figures compiled by the Labor Dept. show that in most respects 1953 was the best year with regard to labor trouble since the beginning of the postwar period. Total strikes beginning during the year amounted to about 5100, counting all disputes including six or more workers. Total time lost from jobs for the 12 months adds up to 27 million, about one-half the lost time recorded during 1952.

The automotive and aviation industries fared relatively well in 1953 with respect to work stoppages, except for the 54-day North American stoppage. Some 32,000 employees were involved at various times at the Los Angeles, Fresno, and Columbus plants during the dispute. However, the total number of idle declined as the strike continued, and workers went back to their job.

Otherwise, no serious work stoppages plagued the two industries during the year. A chronology of the larger strikes follows:

January—11,500 workers of the Hudson Motor Car Co. quit work for three days but returned to the job pending settlement of grievances by regular procedure.

February — 17,000 Studebaker workers walked out at South Bend in protest at a company appointment but returned to the job after three days.

April — Some 48,000 Chrysler workers at Detroit and Trenton, Mich., were out three days in a protest action involving truck pick-ups at a strike-bound supplier plant.

Chrysler Expansion in Canada Continues

An additional step in the expansion program of Chrysler Corp. of Canada, Ltd., took place with the recent acquisition of property at Red Deer, Alberta. On the site will be erected a parts plant costing more than $500,000.

Earlier this year, Chrysler of Canada opened a similar plant at Moncton, N. B. Other parts plants are located at Chatham, Ont., and Regina. The company currently has in progress at Windsor a $20 million construction program which will permit Chrysler to double its passenger car output.

News of the AUTOMOTIVE AND AVIATION INDUSTRIES

GAS TURBINE POWER MIDGET

Compact gas-turbine-powered airborne auxiliary generator sets are now being installed on Douglas C-124 Globemasters. A Mars gas turbine engine, built by Solar Aircraft, which delivers 50 hp but weighs less than 100 lb and is the size of a two-ft cube, provides power for the generator sets they produce 14 kw of direct current.

International Surface Finish Code Drafted

First drafts of an international standards code on surface finish measurement have been completed. The code has been under study for the past eight years by English, Canadian, and U. S. engineers.

Representatives of the American Standards Association, SAE, and National Aircraft Standards Committee have approved tentative standards and nomenclature, and the code is expected to be adopted reasonably soon after review by all interested parties. Representatives of the automobile industry also have participated in conferences on the new code.

New American Bosch Plant to Open Soon in Miss.

Work has started on the construction of the new American Bosch Corp. branch plant in Columbus, Miss.

The new 100,000 sq ft factory is scheduled to be completed by April 1, and production will start immediately thereafter.

The facility initially will be used to manufacture some of the firm's automotive products, such as voltage regulators, electric windshield wipers, and small motors. American Bosch will continue to manufacture Diesel fuel injection equipment, aircraft components, and other electrical products in its main plant in Springfield.

Dow Increases Some Magnesium Prices

Dow Chemical Co. has announced increases in the base price for 20-lb, four-piece, notched primary magnesium ingot to 27¾ cents a pound, up ¾ of one cent. Twelve-lb round ingot has been increased one cent per pound to 29½ cents. The base prices of primary magnesium sticks and turnings also have increased one cent a pound. The price increases went into effect Jan. 1.

New Phila. GMC Dealer

The appointment of a new GMC truck dealer, Frantz GMC Truck Co., which has purchased the GMC retail facilities in Philadelphia, was announced recently. The facilities include a retail store and service garage, a parts and service station, and a used truck lot covering in total an area of nearly 100,000 sq ft.

Harvester to Build Heil Heavy Tractor

International Harvester Co. has concluded an agreement with Heil Co. of Milwaukee under which Harvester will manufacture two-wheel, rubber-tired industrial tractors for heavy construction use. Under terms of the agreement, International acquires certain Heil patents, designs, and manufacturing data.

Until Harvester gets into production, Heil will supply the company with two-wheel tractors. It will also manufacture certain types of scrapers and wagons for International during the period of the agreement.

Bell Takes Lease on Rice & Adams Plant

Bell Aircraft Corp. has taken a seven-year lease on the former Rice & Adams plant in Tonawanda, N. Y. Bell will use the plant in connection with its production of jet-engine nacelles for B-36 and B-47 bombers.

Rice & Adams, a division of Pressed Steel Car Co. discontinued manufacturing operations in the plant last summer. The 55,000 sq ft plant will be Bell's eighth major facility on the Niagara Frontier and will boost the company's total floor space in the area to over 2,150 million sq ft.

Ryan is Awarded New Jet Orders

Ryan Aeronautical Co. has been awarded new production orders for components on the GE J-47 jet engine and for afterburners on the newest model Wright jet engine.

The GE $1.3 million contract, is for a new item, not previously manufactured by Ryan. Completely new tooling will be required for the project, and production is scheduled through 1954 and into early 1955. The order from Wright raises to six the types of afterburners on which work is being performed by Ryan.

Continued on Page 80

Men in the News

Bakelite Co., Bonding Materials Div. — R. A. Richards has been made manager.

Dodge Div., Chrysler Corp. — Jack W. Minor has been chosen director of advertising and merchandising.

Studebaker Corp. — C. K. Whittaker has been placed in charge of all domestic sales.

Precision Castings Co., Inc.—William J. During was elected president.

Titeflex, Inc.—Arthur M. Rogers has been appointed controller.

Chrysler Corp. — James F. Lovett has been appointed defense contract administrator.

Nash Motors Div., Nash-Kelvinator Corp.—**H. G. Paxton** has been made national distribution manager; **G. B. Stone**, national business management manager; and **R. C. Mackey**, Oklahoma City zone manager.

Coleman Co., Inc.—**Douglas C. Albright** has become works manager.

Kent-Moore Organization, Inc.—**Marshall R. Chambers** has been made general sales manager.

Mather Spring Co.—**Harry S. Nau** has been chosen chief industrial engineer, while **Arnold N. Kraft** has been made manager of the Linden, N. J., plant.

Electric Auto-Lite Co., Central Spark Plug Div.—**Fred G. Vanzo** has been appointed manager.

Republic Steel Corp., Alloy Steel Div.—**Clyde E. Roberts** is now manager of sales.

Elmes and King Div., American Steel Foundries—**Joseph A. Cademartori** has been advanced to general manager.

New Process Gear Corp.—**Joseph F. Kerigan** has been chosen president and general manager, succeeding **Anthony A. Henniger**, retired.

United Platers, Inc.—**Glenn H. Friedt, Jr.**, has been promoted to vice-president and assistant general manager.

Eclipse Machine Div., Bendix Aviation Corp.—**Russell S. Johnson** has been appointed director of sales.

Superior Coach Corp., Southern Div.—**Dwayne A. Shields** has been appointed general manager.

Dana Corp.—**J. E. Martin** has been elected president to succeed **Ralph E. Carpenter**, who was elected vice-chairman.

Reliance Electric & Engineering Co.—**C. V. Gregory** has been made manager of district sales; **C. B. Allen Jr.**, Detroit district manager; **Anthony C. Schettler**, Baltimore branch manager; and **Wilmer K. Schlotterbeck**, Buffalo district manager.

Jack & Heintz—**Robert G. Dobbin** is now manager of the commercial engineering section.

General Electric Co.—**William S. Baker** has been named manager of tool sales in the Carboloy Dept.

Quaker State Refining Corp.—**Samuel Messer** has been elected chairman of the board.

Allegheny Ludlum Steel Corp.—**Louis B. Polen** is now plant manager of the Buffalo Foundry.

Torrington Manufacturing Co., Machine Div.—**Gustave H. Froelich** has been advanced to general manager.

E. W. Bliss Co., Canton Div.—**L. G. Jones** has been chosen manufacturing manager, while **R. O. Willoughby** is superintendent of ordnance.

Fisher Body Div., General Motors Corp.—**S. J. Sabjourin** has been promoted to general factory manager in charge of all fabricating plants.

Magnesium Co. of America—**William Johansen** has been elected vice-president in charge of sales.

Goodyear Tire & Rubber Co.—**Sam DuPree** has been selected as general manager of all industrial products, while **Herman R. Thies** has been chosen general of all chemical products. **Frank R. Evans** has been promoted to general manager of the Shoe Products Div.

(*Turn to page* 151, *please*)

Necrology

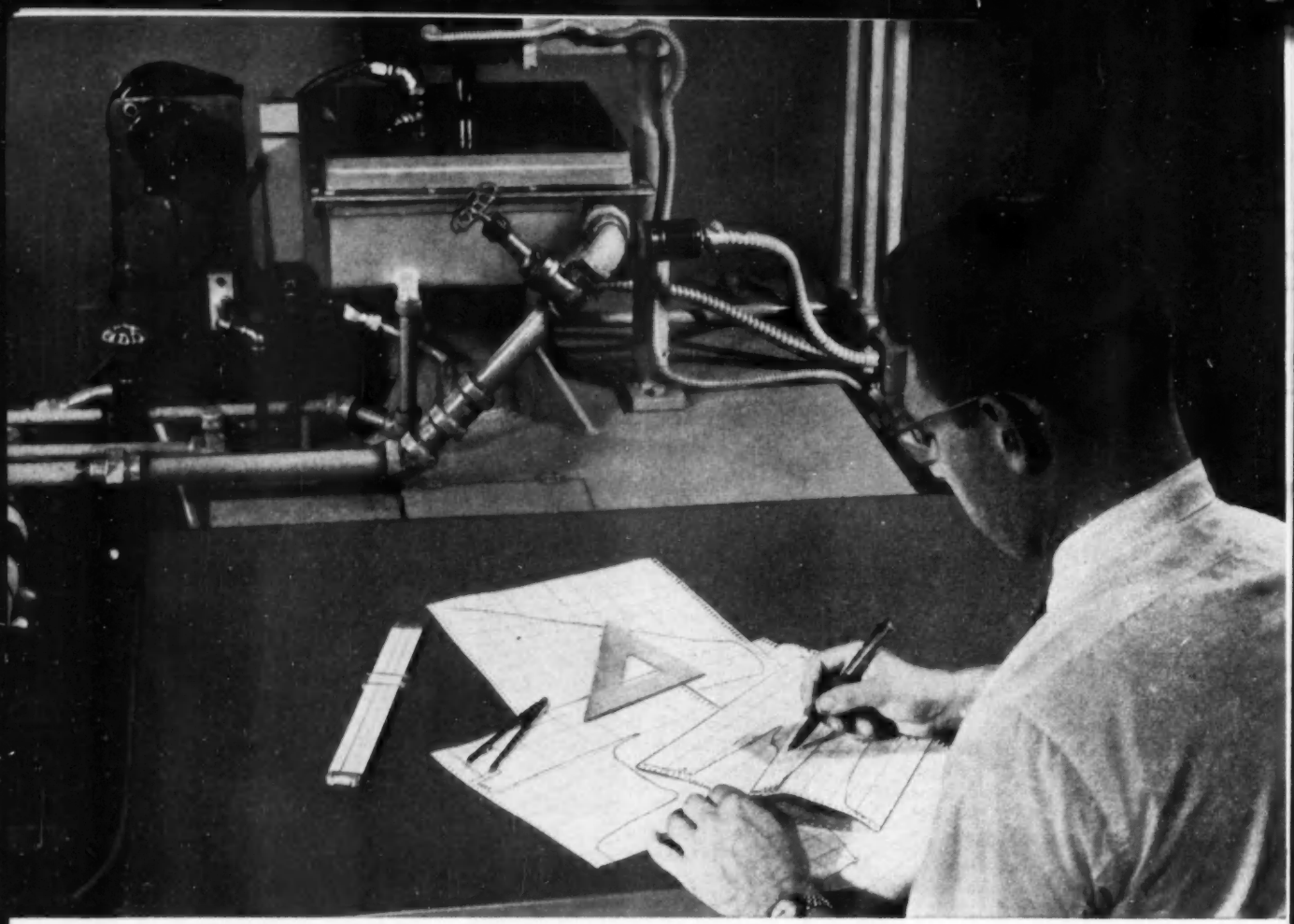
Hugo J. Kurtz, founder of Peninsular Steel Co., died Dec. 15, at Detroit, Mich.

Carl A. Holth, 51, assistant secretary and credit manager of Nash-Kelvinator Corp., died of a heart attack recently aboard a plane.

Lawrence W. Pomeroy, 50, former assistant general sales manager in charge of staff operations for Dearborn Motors Corp., died recently, at Naples, Fla.

Robert W. Desing, 69, former assistant director of industrial and personnel relations for the Budd Co., died recently, at Camden, N. J.

Earl F. Jackson, 77, first Detroit district and division manager and a pioneer in original equipment sales for Goodyear Tire & Rubber Co., died recently, at Detroit, Mich.



A faster way to select facings for wet clutch designs

There are obvious advantages to holding field testing to a safe minimum when you're selecting a facing material for a new wet clutch design. That's exactly what Armstrong can help you do through its continuing program of basic research on cork and cork-loaded friction materials.

Using the laboratory equipment shown above, Armstrong records relative torque and engagement characteristics for many different friction materials under standard, controlled conditions. Points of difference caused by changes in compounding, processing, and operating conditions are cataloged for quick reference. Here's how this work can help you when you're selecting an Armstrong's material.

If your field work should show that none of the materials supplied for initial test is entirely satisfactory, Armstrong's compounding specialists then use your test results as a guide in finding one that is. They do this by comparing your performance data on the particular Armstrong materials tested with the laboratory data on these same compounds. This comparison will show what other Armstrong material is likely to meet your needs or indicate what compounding modifications may be necessary.

This service is used regularly by many leading makers of clutch-operated equipment, including washing machines, automobiles, and farm equipment. It can save you time and testing expense . . . and help assure you of getting the best possible facing performance.

Write today for a copy of our Clutch Facing Check Sheet. Use it to send us data on your clutch. We'll gladly recommend suitable materials, and supply you with sample facings for test. There's no obligation, and the service costs you nothing. Write Armstrong Cork Co., Industrial Div., 7201 Imperial Ave., Lancaster, Pa.

ARMSTRONG'S FRICTION MATERIALS

Can you use these new self-locking Nuts?

Designed for special applications . . . Do they suggest solutions to *your* design problems?

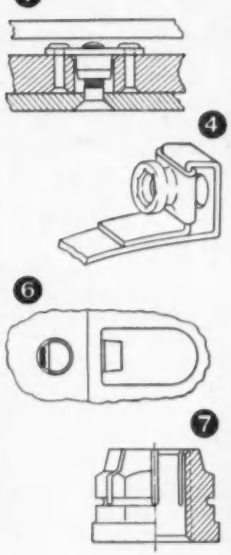
1 TWO-LUG INVERTED ANCHOR NUT For use where clearance or other considerations make it necessary to mount the nut upside down. Clearance hole must be provided for the barrel. Nylon inserts.

2 LIGHT HEX NUT, KEL-F INSERT Special KEL-F insert provides the self-locking, vibration-proof features of all ELASTIC STOP® nuts, for operation under extremely corrosive conditions—or exposed to strong acids—such as fuming nitric.

3 TWO-LUG HIGH-TENSILE ANCHOR NUT For use with 160,000 psi bolts, in blind mounting or in applications where ease of maintenance makes an attached nut desirable. Nylon inserts.

4 SELF-LOCKING CLAMP NUT For installation around the clamp leg, or on slotted strips where a random lengthwise positioning of the nut is necessary. Red nylon locking insert.

5 HIGH-TEMPERATURE, CLOSE CLEARANCE DOUBLE-HEX NUT For applications where weight, wrenching area and elevated temperatures are all major considerations. Temperatures to 1200° F.



6 LIGHTWEIGHT BARREL NUT Barrel nuts permit the use of lighter forgings—and simplify machining. "Bathtub" type recesses are necessary for the bolt head only, since the barrel nut fits into regular drilled hole. Wrenching is simplified because the nut cannot turn. This is a lightweight version of the ESNA high-tensile barrel nut, for 160,000 psi bolts. Nylon inserts.

7 ACCESSORY MOUNTING NUT High-temperature nut for mounting generators or similar accessories having a keyhole-type mounting flange. Large base diameter compensates for seating area lost to slot in flange. Nut straddles slot without Brinnelling the flange. Temperature to 550° F.

8 HIGH-TEMPERATURE FLOATING-BASKET ANCHOR NUT Specially designed for applications where a lesser degree of accuracy in alignment of nut and bolt hole is desirable. To 1200° F.

[redacted]

ESNA

ELASTIC STOP NUT CORPORATION OF AMERICA

Dept. N48-15, Elastic Stop Nut Corporation of America
2330 Vauxhall Road, Union, New Jersey

Please send details on the following fasteners:

☐ 1 ☐ 3 ☐ 5 ☐ 7
☐ 2 ☐ 4 ☐ 6 ☐ 8

☐ Here is a drawing of our product. What self-locking fastener do you suggest?

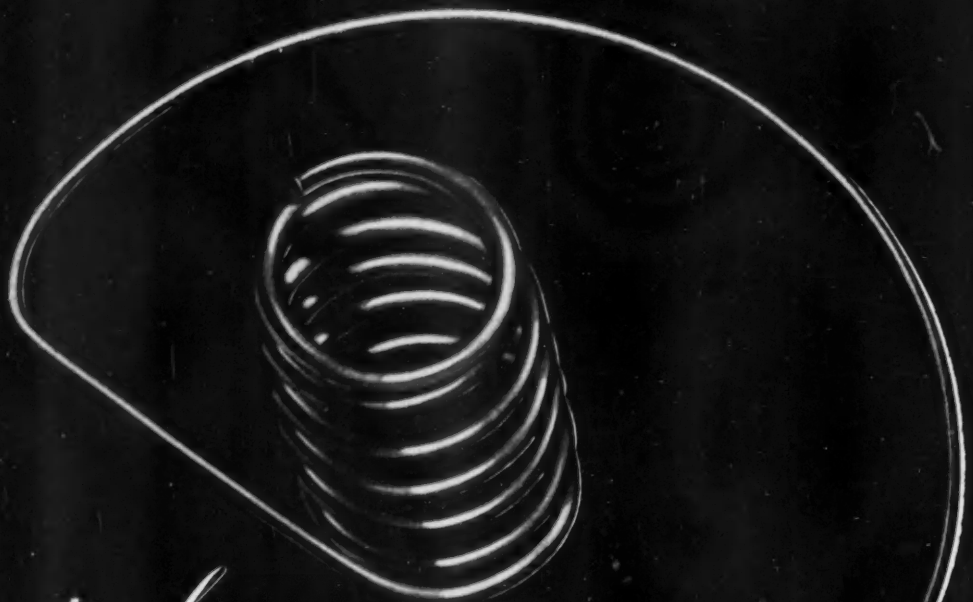
Name_____ Title_____

Firm_____

Street_____

City_____ Zone_____ State_____

a SPRING



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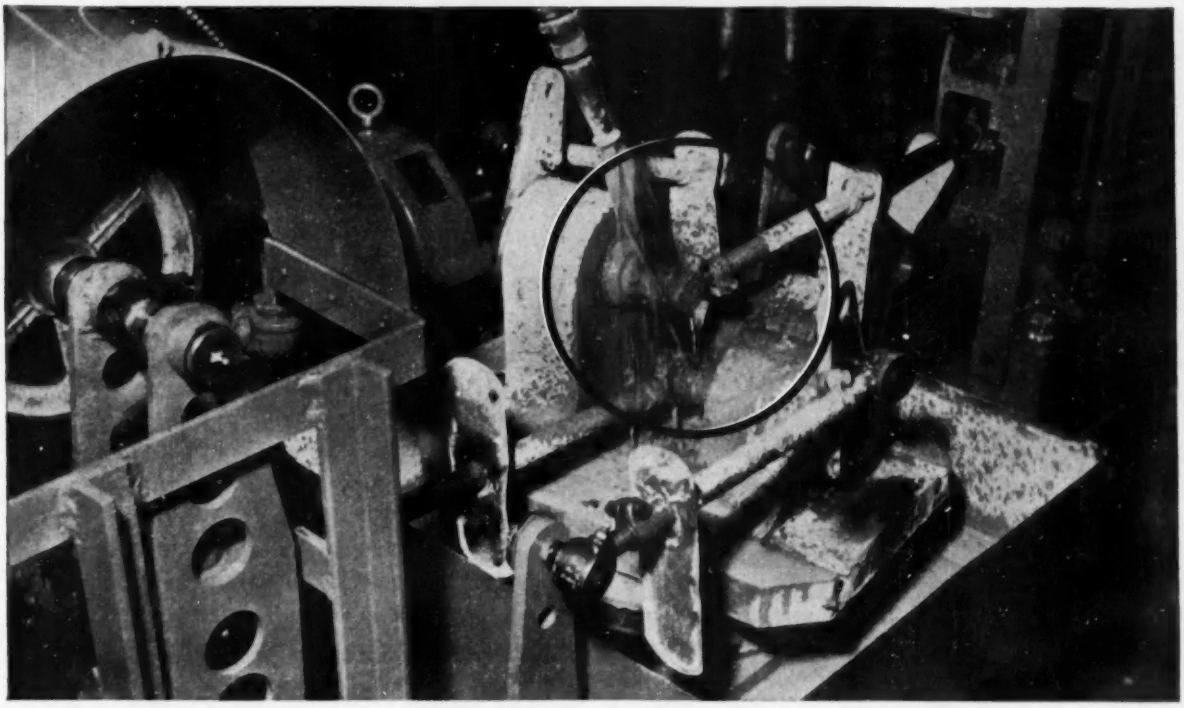
F. N. MANROSS AND SONS CO. BRISTOL CONNECTICUT	**OHIO DIVISION** 1825 EAST FIRST ST. DAYTON, OHIO	**DUNBAR BROTHERS COMPANY** BRISTOL, CONN.	**MILWAUKEE DIVISION** 341 E. ERIE ST. MILWAUKEE, WIS.	**SEABOARD Coil Spring Div.** 15001 S. BROADWAY GARDENA, CALIF.	

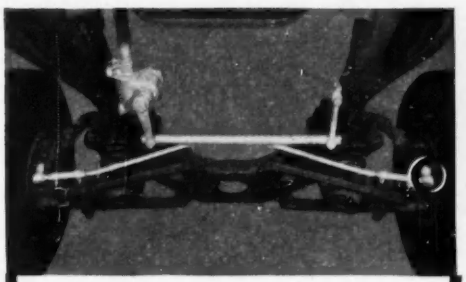
You can count on

Thompson's Performance-Tested steering linkage



A set of Thompson dual bearing tie rod ends gets the water treatment as part of a continuing test to determine the durability of this Thompson linkage.

This test, duplicating actual road conditions of the greatest extremes, is conducted for several weeks. Actually, in some tests, Thompson steering linkage units are subjected to the equivalent of more than 100,000 miles. Units are periodically removed from the testing equipment and carefully analyzed for wear.



You can count on

Thompson Products

MICHIGAN PLANT

Detroit • Fruitport • Portland

THOUSANDS of miles of all kinds of driving —mud, water, ruts, jars and jolts—that's the testing story behind Thompson's dual bearing tie rod ends. It's the story of Thompson Products' exacting steering engineers who carefully performance-test linkage in a laboratory especially designed to duplicate all road conditions. In addition, these linkage units are extensively road-tested by Thompson engineers.

Behind this story is the continuing search for improvement—in materials, in performance, and in manufacturing procedures. New materials, new manufacturing processes, new designs are all subjected to grueling performance tests, such as the one pictured here. Day and night this set of Thompson dual bearing tie rod ends will be subjected to mud, to water, to periods of dryness, and to periods when impact is applied.

The end result of exacting analysis of wear and tear and of thousands of miles of simulated driving, is the best possible linkage systems for cars, trucks, buses, and tractors. Another result is the successful development of such revolutionary steering aids as Thompson's ball-joint front suspension, the greatest advance in automotive steering in 20 years.

If you have a steering linkage problem, let Thompson's steering engineers help you. Just write or phone Thompson Products, Michigan Plant, 7881 Conant Avenue, Detroit 11, Michigan, WA 1-5010.

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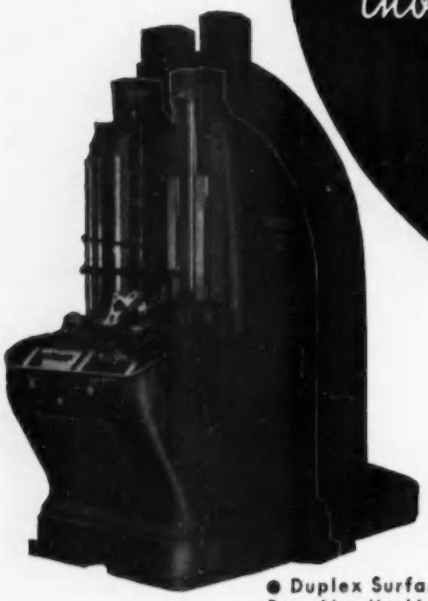
surface broaching
for difficult
machine work



● Duplex Surface Broaching Machine. Made in 5, 10, 15, and 25 Ton Sizes.

● Many types of work can be surface broached on Footburt machines at remarkable savings over previous machining methods. High production is obtained with required accuracy and finish. Holding fixtures are designed for quick, convenient loading. Cutting tool maintenance costs are low. We will be glad to work with you on the application of surface broaching.

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● Single Slide Surface Broaching Machine. Made in 5, 10, 15, and 25 Ton Sizes.

● Continuous Type Broaching Machine. Made in 4 Sizes.

FOOTBURT

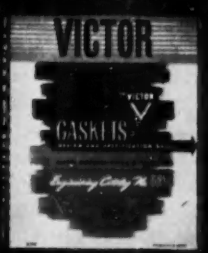
SURFACE BROACHING

Practical Approach to Head Gasket Specs

AN EXCLUSIVE VICTOR SERVICE TO DESIGNERS

	TYPES	STRUCTURES	SECTION
HEAVY-DUTY RANGE	LM	.012 copper top .0094 steel layers .012 steel bottom	
	VIC-2-FOLD	.013-.0145 copper top .045-.050 asbestos layer .015 steel bottom	
	VIC-2-FOLD	.012 copper top .040-.045 asbestos layer .012 steel bottom	
	W.I.	.0094 steel top .060-.065 asbestos .015 steel bottom .054 steel wire	
	W.F.	.0085-.0095 copper top .050-.055 asbestos layer .0085-.0095 copper bottom .012 steel web flange	
	D.O.	.0094 steel top .060-.065 asbestos .012 steel bottom	
	V.R.	.0085-.0095 copper top .070-.075 asbestos layer .013-.0145 copper bottom .0094 steel VR flange	
	S.O.	.0094 steel top .060-.065 asbestos layer .015 steel bottom	
	C.T.	.040-.045 C.S. corbestos .0083 steel shim .040-.045 C.S. corbestos .0094 steel flanges	
PASSENGER CAR RANGE	VIC-2-FOLD	.0085-.0095 copper top .035-.040 asbestos layer .0094 steel bottom	
	T.A.	.0077 steel top .015-.020 asbestos layer .0083 steel bottom	
	S.C.	.015 or .020 steel	
	C.F.	.060-.065 CP corbestos .012 steel flange	
	D.O.	.0085-.0095 copper top .060-.065 asbestos layer .012 copper bottom	
	C.F.	.060-.065 CP corbestos .0094 steel flange	
	S.O.	.0094 steel top .060-.065 asbestos layer .0094 steel bottom	
	S.O.	.0085-.0095 copper top .060-.065 asbestos layer .0085-.0095 copper bottom	
	CORBESTOS	.060-.065 CP corbestos	

COMPARATIVE RATINGS of 18 most commonly used head gasket structures, based on blow-by and burn-out factors.



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This chart with supplementary data gets you quickly to the special requirements and cost factors that influence final head gasket specifications. It eliminates time-taking search and study of gasket design that may be found unsuited to your application. It helps prevent over-sealing as well as under-sealing.

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VICTOR GASKETS • PACKINGS • OIL SEALS

SEALING PRODUCTS *EXCLUSIVELY*

AUTOMOTIVE OUTLOOK for 1954

By Leonard Westrate

Back to Normal

Ever since the end of World War II the automobile industry has been talking about getting "back to normal." If an unlimited supply of materials, a relatively stable labor supply, and fierce competition mark a normal year, 1954 will be that kind of year.

There is general agreement in the industry that this year will be one of the most competitive in history. It will be actually the first full year since 1940 that there will be no artificial curbs on production and that competition will have full play. It should give the industry its first postwar chance to determine just what the potential demand is for automobiles.

The situation today is exactly the reverse of what prevailed a year ago when all companies were operating under materials quotas and the problem was to make the vehicles rather than to sell them. At the end of last year, however, production was unrestricted and competition was strongly in force, setting the stage for the competitive race coming up this year.

Changes at Ford

It is not possible to compare the lineup of companies today with the situation prevailing in prewar years without taking into account the tremendous change that has occurred at Ford. This probably will have a more profound effect on the fortunes of other companies than any other single factor. In those years the Big Three took about 90 per cent of the market, but Ford, by its own admission, was weak at the management level and company spokesmen recently revealed that it was losing money at the rate of $9 million a month as late as 1946.

Since that time a significant change in management and company attitude has made Ford a much more formidable competitor. The company is aggressively seeking to oust Chevrolet from first place and the latter is equally determined to hold its position. In the slugfest between these two economic giants some innocent bystanders are likely to get hurt.

By any standard last year was an extremely good one for the automotive industries, being surpassed only by the boom year of 1950 in most facets of the business. Production was approximately 6.14 million passenger cars, the second highest on record; truck production his about 1.2 million, the sixth highest on record, but still sufficient to bring the total number of vehicles to 7.34 million, surpassed only by the 8 million total turned out in 1950, and about 33 per cent ahead of 1952.

Not all automotive activity was at a new peak last year, however. Replacement parts and accessories showed a drop to $1.9 billion from $2.16 billion the previous year. These figures are based on Commerce Dept. reports and there is some doubt in the industry that they reflect an accurate picture since certain items are excluded and there is no good breakdown between replacement parts and accessories. Exports also declined last year to 312,000 from 329,000 in 1952. Nonetheless, total overall business in 1953 was at the highest dollar value in history.

Cautious Optimism

If there is any such thing as an official automobile industry outlook for 1954 it is one of cautious optimism. General consensus now is that it will be an excellent year but not as good as 1953, with production running in the neighborhood of about 10 per cent less for a total of 5½ million passenger cars and about one million trucks. There is some evidence, however, that privately some industry leaders think production and sales next year might again surprise everyone and come close to the 1953 level.

There certainly is no doubt that the economy is strongly buttressed by employment, personal income and savings at the highest levels in history. There also is little question that new cars are high on the demand list of the American public and with competition certain to make actual buying prices more attractive this year it is not at all unlikely that sales may approach the 1953 level.

Less Defense Work

There will still be considerable defense work in the automotive industries this year but it will not be at the same high level that existed in 1953. There have been some rather sizable cutbacks in automotive

defense contracts, particularly at certain companies.

Kaiser is totally out of the aircraft business but still has military work at its Willys Motors subsidiary, primarily in the form of jeeps and specialized vehicles. Chrysler is winding up production of its tank contracts but will take on a tank retriever job at the Detroit Arsenal which operates for the Government. Ford also is out of the tank business, which leaves Fisher Body division as sole supplier of medium tanks. Cadillac also is retaining its light tank business.

Studebaker is out of the military truck business and has had its aircraft engine program cut back, as have Chrysler, Packard, and Buick. Lincoln-Mercury also lost its contract for jet engines during the year. On the whole, the industry has not greatly deplored the reduction in defense work, however, considering any reduction in defense expenditures as desirable for the economy.

Used Cars

There is growing conviction in the industry that used car sales will be the determining factor in new car business this year. There apparently has been some pickup in the used car market in recent weeks and prices now have about reached their prewar ratio with new car prices so that a more normal relationship exists, making it easier to move the cars that are taken as trade-ins.

Scrappage last year also was at a very high rate. Official figures are not yet in but it looks as though approximately 3.3 million cars and 600,000 trucks were scrapped in 1953. With an estimated 11 to 12 million prewar cars 13 or more years old still in use, the scrappage rate this year should be even higher, bolstering the new car market.

Consolidation of Independents

The extremely competitive market this year will have some far reaching effects on the entire industry. It may result in hastening consolidation or merger among the independents, particularly in respect to Hudson and Nash who have been exploring the possibilities for some months.

Nineteen fifty-three saw the consolidation of Kaiser and Willys and several mergers or outright acquisitions among truck companies and automotive suppliers. Chrysler also acquired Briggs in a move to consolidate its own position in respect to its large competitors. All of these mergers and acquisitions are designed primarily to make for a more efficient operation and to bring production costs into line to meet competition.

Corporate merger is not necessarily required for independent companies to achieve benefits of combined operations. There has been some thought given to the possibilities of using common body dies for low volume models, such as station wagons, although nothing definite has developed on this as yet. Other areas for common effort would be using excess capacity of tools or other facilities of one company by other independents, utilizing a common basic engine with performance characteristics achieved by each company through various modifications such as manifolding, compression ratio, etc., and perhaps more adoption of parts and components common to all cars to achieve economy in large scale purchasing. There is yet no indication that any of these developments will come about soon, but it is highly likely that they will get more serious attention. The complexities of integrating facilities, personnel, dealer bodies, and products of any two companies are monumental, and any integration either corporate or otherwise would be a lengthy process.

Efficient Production Equipment

The pressure of competition also bodes well for manufacturers of new and modern machine tools and other up-to-date equipment. Lower production costs are more of a primary objective than they have been in nearly 15 years, and more automatic machinery and cost cutting production equipment provide the best avenue toward lower unit cost. Despite the heavy investments made by the industry in new plants and equipment in the postwar years there still are many large areas in the industry where equipment is obsolescent and which will require replacement during the next year or two.

While the industry's major expansion program is fairly well completed there still is considerable work under way, particularly at Ford, which expects to spend another $500 million during the next three years on expansion. Chrysler also has some expansion under way on the west coast. General Motors has not revealed plans for rebuilding the transmission plant which was destroyed by fire in Livonia, Mich., but it very likely could start construction there this year on a new plant to be used either by Detroit Transmission or by some other division. Cadillac has plans for expansion and a new plant for that division may come along within the next year or two. The independents, by and large, appear to have very little in the way of new construction under way.

Labor Relations

The outlook for labor this year is fairly good. The manpower pinch has pretty much disappeared and with five-year contracts not open for renegotiation until 1955, a fairly stable labor relations situation throughout the year is in prospect. Toward the end of 1954, however, there undoubtedly will be an increasing barrage of propaganda from union officials in a warm-up for a guaranteed annual wage drive which will come when contracts are reopened in 1955.

Easier Credit

Another development stemming from the increased competition is a trend toward relaxing credit, particularly on new car installment sales. This will take the form principally of extending the contract over a longer period, but leaving the down payment at about

(*Turn to page* 88, *please*)

Oldsmobiles for 1954 *have* New Bodies *and* Larger Engine

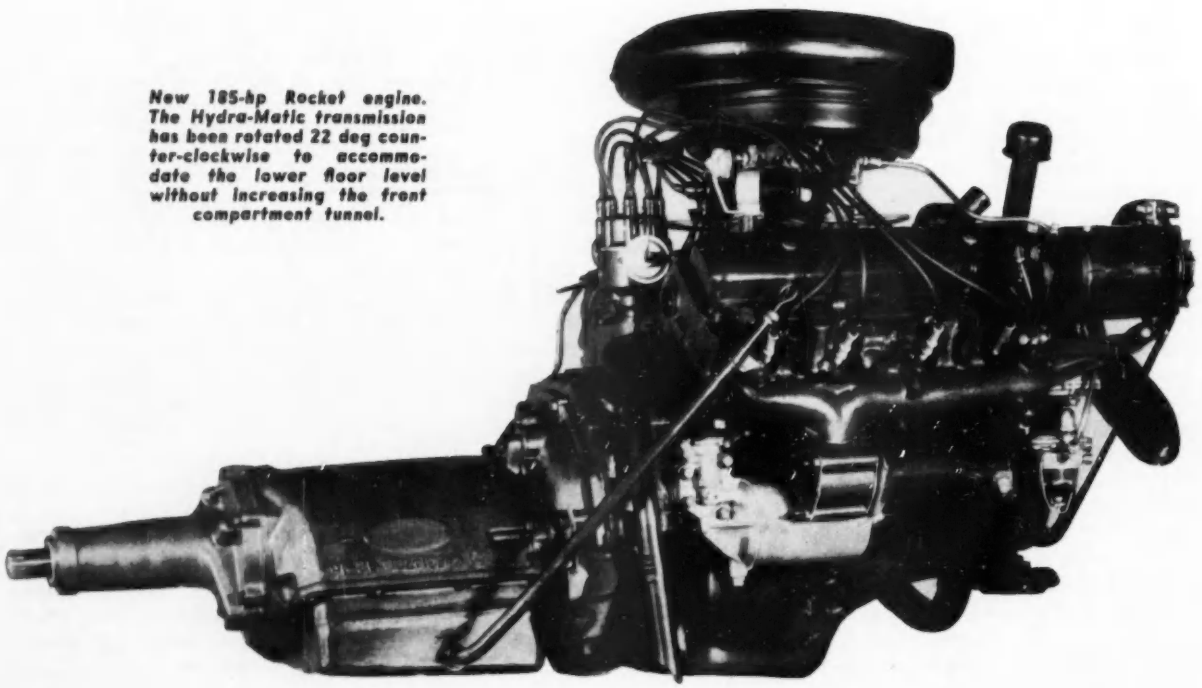
STEMMING from an extensive engineering program concerned with engine and chassis development as well as entirely new bodies and styling—both exterior and interior, Oldsmobile enters the 1954 model year with a comprehensive line of 11 models. The setup of models and series is as follows: 98 Series—four-door sedan, Deluxe Holiday coupe (hardtop), Starfire (convertible), Holiday coupe; Super 88 Series—four-door sedan, two-door sedan. Holiday coupe (hardtop), convertible coupe; 88 Series four-door sedan, two-door sedan, Holiday coupe.

Bodies for the entire line are new and distinctive, and feature wrap-around windshield construction which eliminates corner post blind spots. Major changes in the chassis combine with lower bodies to further reduce the center of gravity, giving a roof height of only 60.5 in., more than three inches lower than last year. Supplementing the new bodies there is entirely new sheet metal—front and rear fenders, hood, deck lid, etc., as well as a new look in grille design and front and rear bumpers.

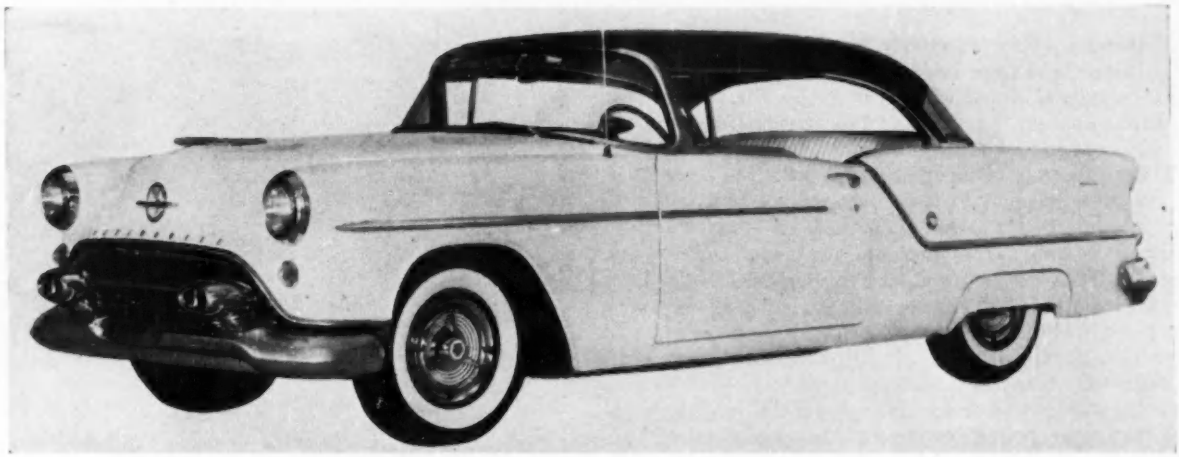
Perhaps one of the most noteworthy features of styling treatment is found in the influence of the Oldsmobile Starfire sport car. Certain Starfire features have been incorporated in all models but this is particularly true of the 98 Starfire coupe and all Holiday models. Although these models have the appearance of expensive and exclusive sport cars, they will be priced well within the range of conventional models.

Wheelbases have been upped—the 98 Series being mounted on a 126-in. chassis; while the Super 88 and 88 are on a 122-in. chassis. Longer wheelbases coupled with lower lines give the appearance of considerably longer cars, although overall length is only slightly greater than before.

The 1954 product bristles with mechanical improvements and changes, perhaps the most noteworthy being the changes in the basic engine. As shown in the tabulation, the engine has been changed materially by increasing the bore to 3⅞ in., thereby increasing displacement to 324 cu in. When used in 98 and Super



New 185-hp Rocket engine. The Hydra-Matic transmission has been rotated 22 deg counter-clockwise to accommodate the lower floor level without increasing the front compartment tunnel.



Super 88 Holiday coupe. Total glass area is 221 sq in. greater than the comparable 1953 model.

88 cars, the engine equipped with the four-barrel carburetor has an output of 185 bhp maximum; when used with a dual-throat carburetor on 88 Series, the engine is rated 170 bhp.

Displacement was increased to get higher torque, particularly at lower speeds, making possible the use of lower gear ratios. The combination of economy gear ratios, changes in carburetor calibration, timing, etc., is said to promise an important increase in fuel economy.

It is noteworthy that the increase in displacement produces an entirely new engine, since the block, heads, pistons, piston rings, and piston pins are different. The lower end of the structure remains the same, however, since the crankshaft, connecting rods, and main bearings are unchanged.

Numerous changes in design detail have been made incident to the change in displacement and engine characteristics. The intake manifold has been changed and branches enlarged to take care of increased breathing requirements. The camshaft has been changed, with modifications in cam profile at the ramps to effect quieter valve operation. Valve stem seals of new type have been provided to prevent oil leakage. The ignition distributor now incorporates new centrifugal and vacuum advance controls as a further aid in improving fuel economy.

The quadri-jet carburetor on 98 and Super 88 models is new. While it is quite similar to the previous model in basic design, it is lower in height in keeping with a lower hood line, has an improved idling system, and incorporates two new filter screens. The new air cleaner and silencer assembly is more compact to fit under the lower hood.

Fuel tank capacity has been increased to 20 gal. In addition, the tank now is fitted with a unique Saran plastic filter element of spool design, as illustrated, said to be effective in separating water from gasoline and preventing entry of water into the fuel lines.

The 12-volt electrical system is continued with some improvements, an item of particular interest being that the battery now is shorter, more compact, and of nine-plate type. In addition, the wiring harness has been greatly improved by using individual wire covered with a colored plastic sheath for circuit identification and cleaning up both installation and servicing by carrying the wiring and fuses into a central junction panel mounted on the dash.

Another interesting engine change is found in the improved exhaust piping system. The exhaust pipe from the right hand bank now leads directly into a junction box on the left, eliminating one connection, cleaning up the exhaust line and making the oil filter more accessible for filter element changes.

Power steering is continued as an optional feature, the Saginaw integral type steering gear now being fitted with a new, shorter travel control valve which

BRIEF MECHANICAL SPECIFICATIONS

1954 Oldsmobile Rocket Engines

90-deg OHV V-8's

	98 and Super 88	88
Bore (in.)	3⅞	
Stroke	3 7/16	
Displacement (cu in.)	324	
Compression ratio	8.25 to 1	
Bhp (max.)	185 @ 4000 rpm	170 @ 4000 rpm
Torque (lb ft max.)	300 @ 2000 rpm	
Carburetor	Quadri-Jet	Dual throat
Fuel	Premium	

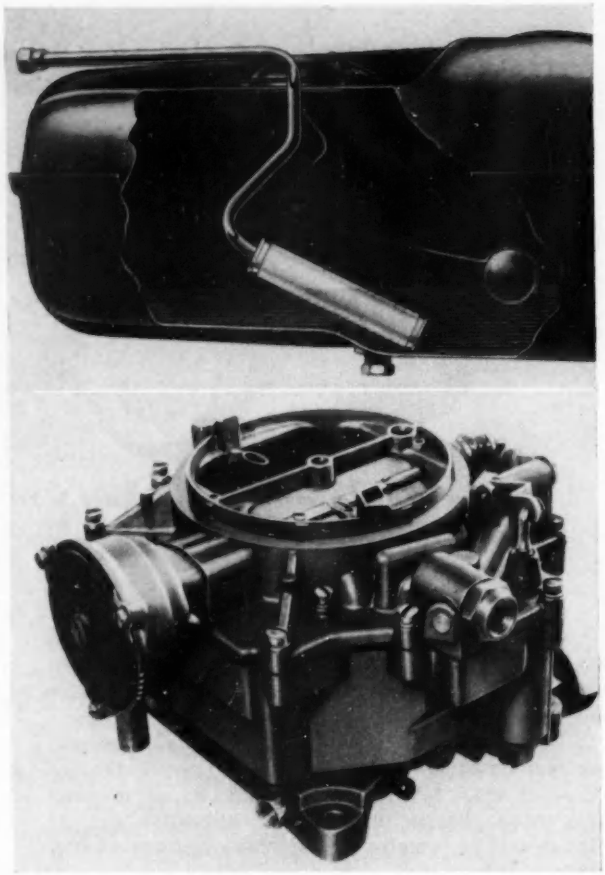
is found to very effectively eliminate back-lash.

Brakes have been improved by the adoption of a new type of lining which has longer life and is less susceptible to fading. The optional power brake system has been improved by provision of a larger reservoir cylinder, together with the addition of a solenoid valve which acts to seal the reservoir when the car is parked or when the engine is dead. This provides for a number of power brake stops with a dead engine.

Hydra-Matic drive has been improved by changing the valve body to effect smoother upshifts in second and third gears. In addition, the torus covers have been made smaller. Another important item is a change in the mounting of the H-M drive to the engine, the entire assembly being rotated at an angle of 22 deg in a counterclockwise direction. This is done to accommodate the lower floor level without increasing the tunnel in the front compartment. Incident to this change in mounting the shape of the oil pan has been changed to a trapezoidal cross-section, as illustrated.

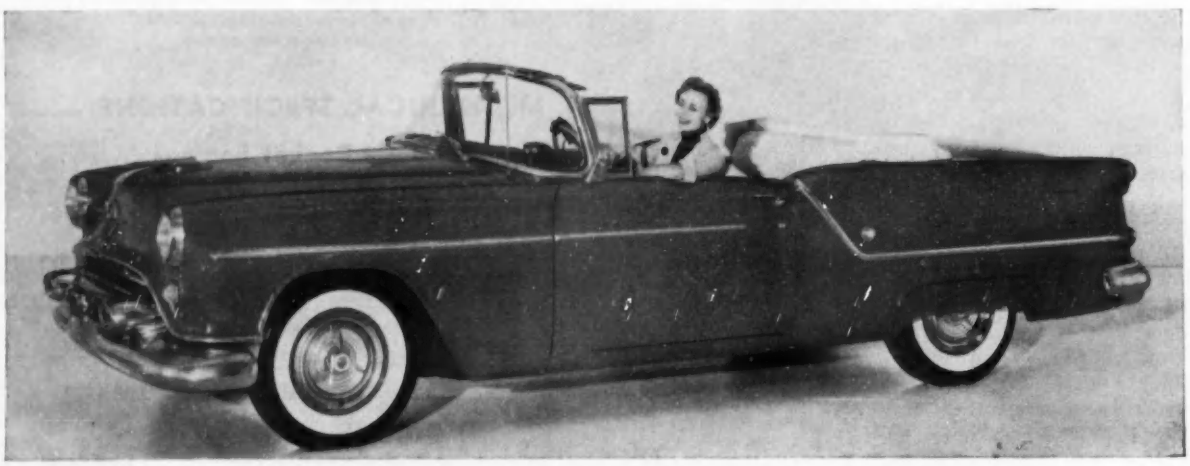
Perhaps the most sweeping changes have occurred in the chassis. Frames are new, with shallower but heavier section side rails and with a more rigid X-frame section to provide for adequate torsional rigidity. Front coil springs have larger diameter and heavier gage wire to take care of increased car weight and to reduce stress level.

The front tread remains at 59-in., but the rear tread has been decreased to 58 in. In addition, the rear semi-elliptic springs and rear shock absorbers have been moved closer to the wheels to increase stability and improve the ride. At the same time the rear springs, which were formerly toed-in at the front ends, now are parallel to the side rails. The rear shock absorbers are mounted with more angularity with respect to the horizontal axis due to lower frame height.

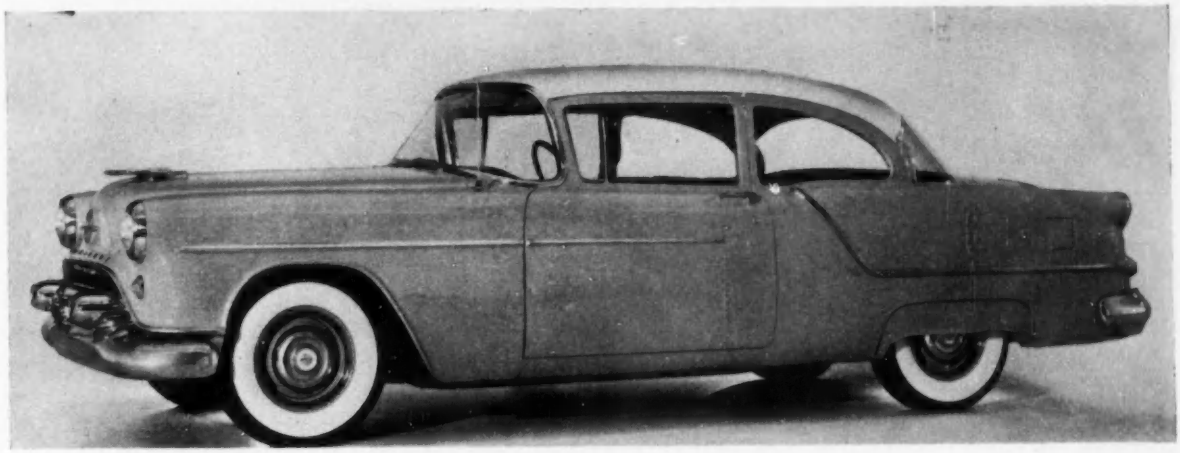


Upper illustration shows sectional view of Saran plastic filter element in fuel tank. Lower view shows Quadri-Jet carburetor, redesigned and improved for 1954. Height has been reduced to meet the lower hood requirements

Also steering knuckle supports have been redesigned in keeping with the lower frame height, and the rear



Super 88 convertible coupe which is powered by a 185-hp engine. The top is hydraulically operated



Roof height of this 88 two-door sedan is only 60.5 in. Adequate road clearance is maintained through a completely new chassis design

stabilizer has been changed for the same reason. Larger capacity universal joints have been adopted, capable of handling increased engine torque.

As mentioned earlier, rear axle ratios have been changed in some instances to achieve improved economy. The setup of gear ratios is as follows:

	98	*Super 88*	*88*
Synchromesh	3.42	3.42	3.42
Hydra-Matic	3.23	3.23	3.07

Standard tire size is 7.60x15 (except for 8.00 on 98 Starfire) but the 8.00 oversize now is offered as optional equipment in all Series.

Although the air conditioning system, offered as optional equipment, remains basically the same, it has a larger capacity evaporator. The assembly is reduced in weight, and an improved compressor now is offered.

Returning to features of the new bodies, one of the most noteworthy advances is found in the provision of an outside cowl ventilator, consisting of a narrow duct at the base of the windshield extending clear across the width of the windshield. It is open at all times, and covered with a stainless steel, perforated panel. This opening leads air under pressure directly from the outside at the upper level into a large plenum chamber. The air stream is then directed to the ventilator system leading into the interior. This arrangement eliminates the under-hood ducts previously employed for leading the fresh air stream from the front grille location. Extensive road testing is said to have proved that the cowl duct is free from entry of fumes from exhaust and that it virtually eliminates dust even when driving on unpaved roads.

An optional feature is the four-way adjustment front seat which can be operated by an electric mechanism.

The instrument panel is new, and features distinctive treatment in harmony with the interior treatment of a given car. The safety pad, mounted over the instrument panel, offered as standard on 98's and at extra cost on other models, now is made of Fiberglas plastic which is said to have better cushioning properties and is free from rebound.

Finally, it may be noted that interior treatment is fresh and distinctive, and offers many pleasing and novel combinations of trim at the buyer's option.

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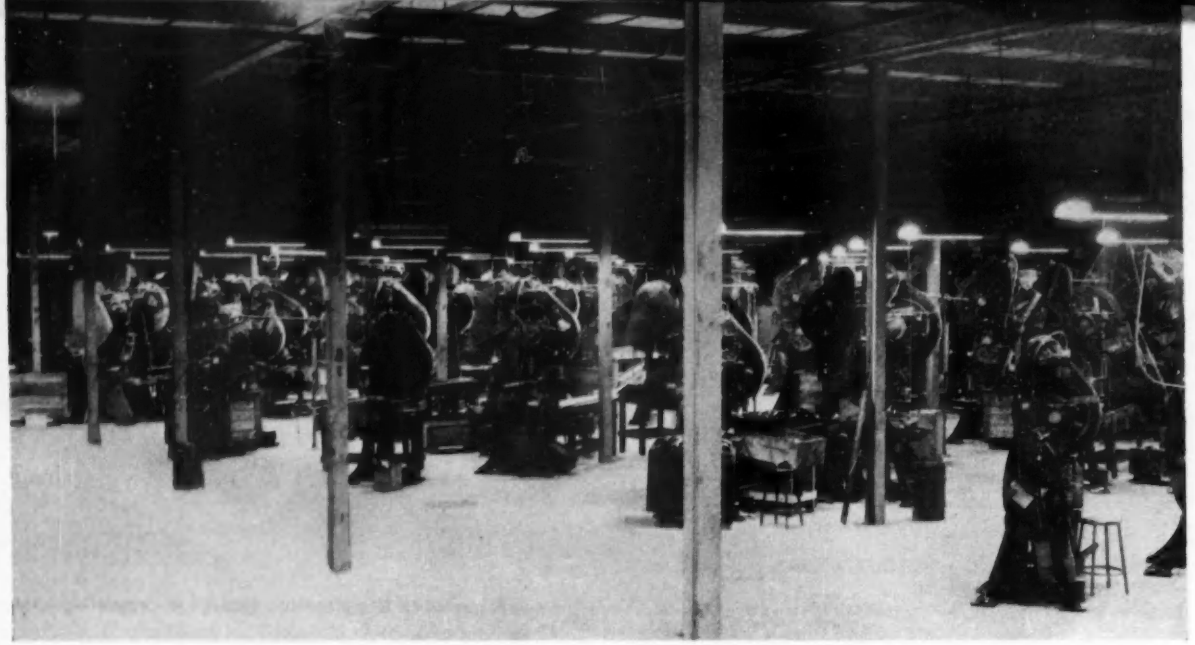
Battelle Develops Process for Bronze-Alloy Plating

A new readily controlled process for bronze-alloy plating has been developed by electrochemical engineers at Battelle Institute, Columbus, O. Laboratory studies, backed up by plant operations, demonstrate several engineering and decorative applications for it.

In one application, hydraulic pumps are now produced by applying adherent bronze electroplates to bearing surfaces. In this application, bronze-plated steel and bronze-plated iron castings reportedly furnish an excellent combination of good bearing properties, high strength, and simple design. In other applications, bronze plate produced by the process has been shown to be a good material for facing valve seats.

There are three compositions of the copper-tin bronze-alloy deposit recommended for different purposes. The newly patented process (known as Lustralite) was developed at Battelle under the sponsorship of The City Auto Stamping Company, Toledo, Ohio. Columbus Metal Products, Inc., Columbus, Ohio, set up the first commercial installation and with it has produced much work for the Denison Engineering Co., hydraulic press and pump manufacturers.



General view in the new press shop, showing arrangement of presses in rows.

New Press Line for Air Cleaners Has Special Scrap Disposal System

In a move designed to centralize heavy duty tractor air cleaner production and assembly, the United Specialties Co., Chicago, recently placed in operation a new 32,000 sq ft addition to its plant. This has made it possible to move all tractor air cleaner manufacturing into the new section, providing a corresponding amount of floor space for further expansion of facilities for the high production air cleaners for automobiles and trucks.

The new addition, devoted entirely to press operations, is arranged to facilitate the most economical flow of operations during relatively short runs on the variety of large air cleaners required for heavy duty installations. To this end the major part of the area is laid out in rows of press lines, each one of which can be quickly tooled for making a specific part. Thus it is feasible to schedule either short runs or longer runs and switch operations from one press line to another without interfering with the orderly course of events at any time.

In the array of presses installed in this department there is a large group ranging in capacity from 30 to 100 tons. Noteworthy feature of the new program is the acquisition of some 30 new Bliss presses ranging from 85 to 100 tons in capacity.

One end of the building has been arranged for receiving sheet steel and terne plate required for this operation, a battery of shears, and a line of blanking presses which prepare the blanks for the press shop.

Best evidence of modernity incident to the expansion program is the installation of a compact and noteworthy scrap conveyor system, tailored to suit the specific requirements of the operation. It may be noted at this point that blanking presses are arranged in a single row with the scrap conveyor running along under this line. Each blanking press, in turn, is provided with an inclined gravity chute resting on the floor.

Since the product employs both steel and terne plate and since both materials may be blanked on the same press during different runs, the chute is designed to keep the two materials segregated from start to finish. This is accomplished in simple fashion by fitting the chute with two openings—one for steel, the other for terne plate—each one being controlled by a suitable gate. These openings, in turn, have individual chutes leading directly onto the scrap conveyor. In operation, the press operator simply opens the proper gate depending upon the type of material being handled.

The scrap conveyor is rather unique in design. It is power-driven and fitted with a divider in the center for segregating steel and terne plate. In its movement from the start of the line to the outside, it transports both kinds of scrap at the same time, thus serving the same function as would two different conveyors. This scrap conveyor handles scrap from the press shop as

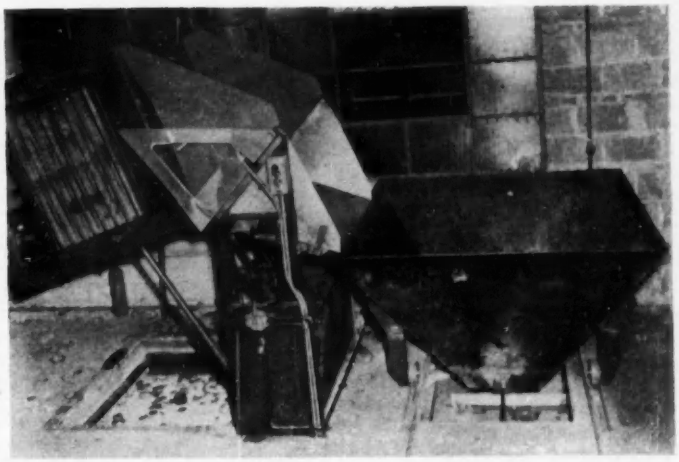
well. Since it was not found to be expedient to move scrap automatically from each press line, the scrap at each press is collected in a bin and then transported to the loading end of the conveyor line by means of industrial trucks. Here again the scrap is kept segregated.

As illustrated, the loading end is designed to accommodate a standard bin which is pushed into place by the truck operator. The load is then raised by means of a hydraulic lift and at the same time is tilted so as to dump the charge into a skip. The skip, in turn, is pivoted in such fashion as to discharge selectively into one of two openings to the conveyor, depending upon the material.

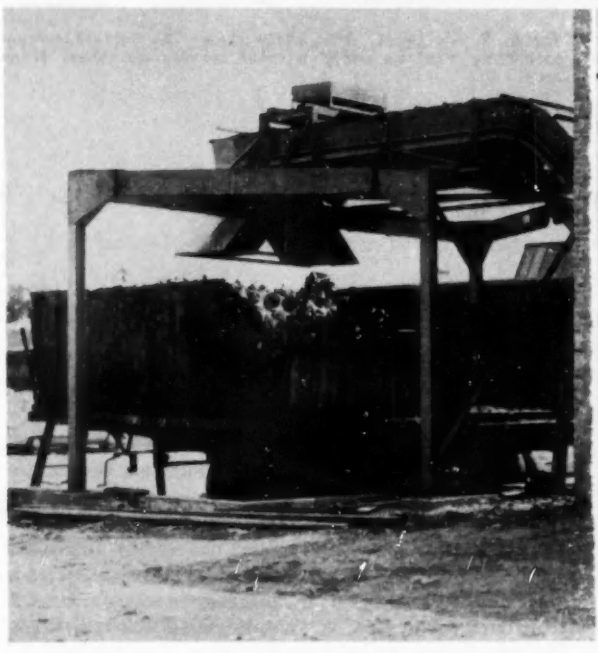
Thus the scrap conveyor transports material from the press shop as well as from the blanking line in its travel from the loading end to the discharge station. As the conveyor nears the end of the building, it arches upward to the ceiling and continues out of the building to terminate at the discharge station.

At this point there is a loading dock accommodating two trailers, side by side, one for terne plate, the other for steel. The conveyor discharges continually, without an attendant, until the trailers have been filled.

Apart from the benefits of a self-contained department exclusively for heavy duty air cleaners, there is an additional gain in operating efficiency by virtue of removing short run items from the busy main plant where lines are operated continuously on parts required for mass production applications. Scheduling in both departments has been greatly simplified. At the same time, since the short run and special jobs require more individual attention as well as more frequent changes in tooling, this move permits better serving of customers purchasing heavy duty components.



Loading station for small scrap from the presses. The steel bin containing scrap is seen in tilted position ready to unload into the skip at the right.



Perspective view of blanking line, showing the chutes leading down from each press and discharging to the scrap conveyor. The hopper loading station may be seen in the foreground; conveyor exit from the building, in far background.

Discharge end of the scrap conveyor which may be seen leading out of the building at the right. Trailers used to haul away scrap are parked directly under the outlets from the conveyor line.

C-97 Stratofreighters in production at the Boeing-Renton plant for U. S. Air Force. This photo shows the horseshoe-type final assembly area with the line doubling back on itself, thus permitting final assembly without moving personnel from place to place.

Aviation Prospects for 1954

It is difficult to forecast the level of activity of the aircraft industry during 1954 with any degree of accuracy. For the first several months of the coming year it appears that unit production of military aircraft will remain at the present level—about 1000 planes per month—after which it will gradually taper off, although the rate of decline cannot be forecast at this time. It appears definite, however, that monthly production of military aircraft by the end of 1954 will be appreciably less than current rates.

From the standpoint of airframe weight, it is anticipated that the present trend will continue and that production by this measurement will reach its peak in the second quarter of the year, after which it, too, will gradually decline, although not to as marked a degree as the reduction in units.

In the commercial field a further decline in transport airplane production is in prospect despite the anticipated increases in air passenger travel and in air freight movements. Increased production of utility aircraft and in helicopters for commercial use is in prospect, although the degree of increase cannot be forecast with accuracy.

In all probability employment will not exceed 775,000 and, beginning with the second quarter of the year, will gradually decline to some 725,000 by year's end.

Despite the decline in military and commercial transport production, it is anticipated that sales for the year will be close to the $9 billion figure estimated for 1953. Sales volume of the twelve largest airframe producers again is expected to be about $5 billion.

Also in prospect for 1954 is a continued curtailment

of large scale subcontracting which marked the Korean War production expansion program. More and more work will be performed by the prime producers as their production rates are reduced.

The striking power of our military air arms will continue to show marked improvement as more modern planes with greater performance capabilities are added to military inventories. At least four new jet fighter models will reach volume production during the coming year and deliveries of jet bombers will continue to increase. Also in prospect are the first deliveries of a turbo-prop transport model for the military services.

Jet Aircraft Production to Increase

Production of jet aircraft will continue to increase and by year's end may comprise 75 per cent of the monthly military aircraft output. Last year saw delivery of the last piston-engined fighter and in all probability the last piston-engined bomber will be delivered during 1954.

As the production peak of the present air rearmament program is reached and the reduction in the level of activity of the aircraft industry begins, it is of paramount importance that steps be taken to insure that this reduction will not dislocate the effectiveness of the industry, and its ability to expand rapidly in the event of a major emergency.

Therefore, it is imperative that a national air power policy be adopted and constantly reviewed, and that a long-range program of aircraft research, development and procurement be established and maintained at all times in accordance with existing and prospective conditions. Necessary to such policy and programming are the following:

1. Maintenance of a strong and active program of research and development, irrespective of periodic fluctuations in the international situation. Such a program should use the full competitive values of a resourceful aircraft industry.

2. Maintenance of a sufficiently broad production base within the industry to permit rapid expansion in the event of an emergency.

3. Maintenance of a going rate of production sufficient to hold together an important nucleus of engineering and production teams and to provide the Military Services with the latest and best weapons.

4. Recognition of the vital importance to national security of a healthy, stable private aircraft industry financially strong and unhandicapped by a policy which limits its profits on sales to less than half the national industrial profit average.

By Admiral DeWitt C. Ramsey, USN (Ret.)
President, Aircraft Industries Association

Accomplishments in 1953

During 1953 the aircraft manufacturing industry operated at an unusually stable level of activity. There were no significant variations in monthly unit production rates as military aircraft deliveries, representing 90 to 95 per cent of the volume of work performed, were approximately 1000 planes per month, and employment increased only slightly in keeping with the gradual increase in production measured in terms of actual airframe weight and in deliveries of civil aircraft.

The year saw the completion of the expansion program undertaken following the outbreak of the Korean War and the attainment, in so far as unit deliveries were concerned, of the peak production levels called for by that expansion. The military production peak measured in terms of airframe weight had not been reached by the year's end, although an estimated 150 million pounds of airframe weight had been delivered to the industry's military as well as to civil customers.

This relatively high level of activity was reflected in the sales of aircraft, aircraft engines, propellers and spares which are estimated at $9 billion for the year. Monthly sales in excess of $900 million were being registered generally as the year drew to a close.

Culminating the effort to expand military aircraft production begun with the outbreak of the Korean War, this year's production, in dollar volume, was the third largest in the history of the U. S. aircraft industry. Annual production during this period has steadily increased from the 1950 rate of some 3000 military planes to the current figure. This four-fold increase in deliveries during the past three years was made possible by a very large expansion in work force—from 262,000 to 750,000—and in floor space—from 63.5 to 135.8 million sq ft. During the period an outlay of some $3.5 billion was made for new facilities. Of this sum approximately 66 per cent was for tools and equipment and the balance for plants and structures.

In this respect it is pertinent to note that a substantially larger share of facilities expansion resulting from the Korean War was privately financed as compared to the World War II record. During 1940-1945, $3.8 billion was invested in facilities of which only $420 million or 10.8 per cent was privately financed while during the expansion resulting from the Korean mobilization $1.2 billion or 34.1 per cent was privately financed.

Significant Changes

There were many changes during the past twelve months which affected the industry but most of these were sufficiently long-range in nature that they did not affect the year's production schedules nor the industry's ability to meet those schedules. Among the significant changes taking place during the year were:

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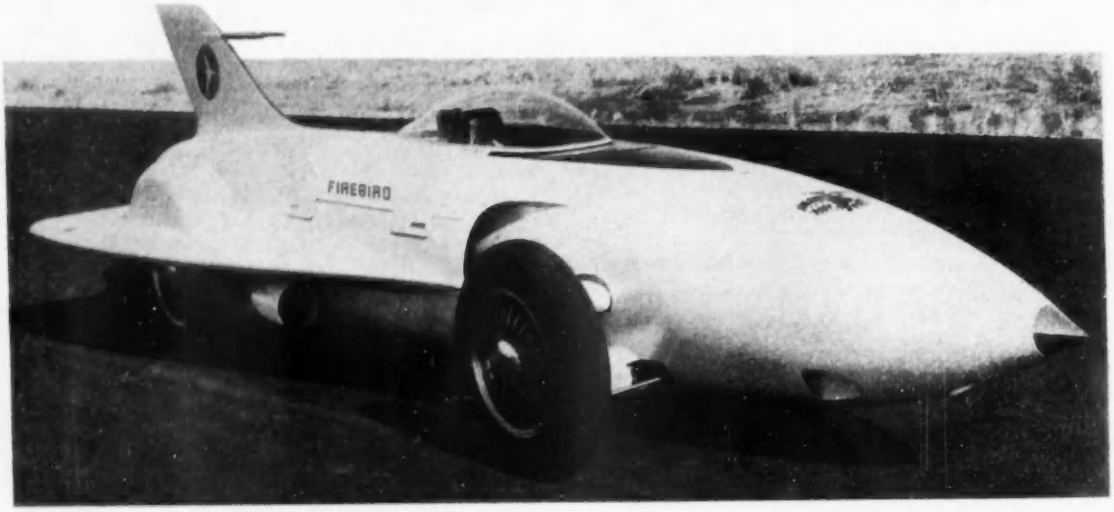
General Motors Firebird . . .



Right front quarter view of the XP-21 Firebird. Note the brakes mounted outside the wheels.

THE most spectacular exhibit in the General Motors Motorama, to be held in New York City, Jan. 21 to 26, will be the XP-21 Firebird, a 370-hp, gas-turbine-driven experimental car with futuristically styled fiber glass plastic body. The car definitely is not designed for any highway use but is intended primarily to help explore the commercial possibilities of gas turbines and to add to General Motors' knowledge of aerodynamics.

The main objective is to determine whether or not the gas turbine can be harnessed for efficient and economical performance and low and normal automobile driving ranges. The problems involved are quite apparent, in view of a minimum idling speed of approximately 8000 rpm and exhaust temperature of about 1000 F in a volume several times that of a conventional engine. Even starting equipment is a problem, since the engine must be reeved up to 3000 rpm to get it running. GM has not yet released any data on fuel consumption, but it is known to be very high, far in excess of any piston engine used in automobiles.

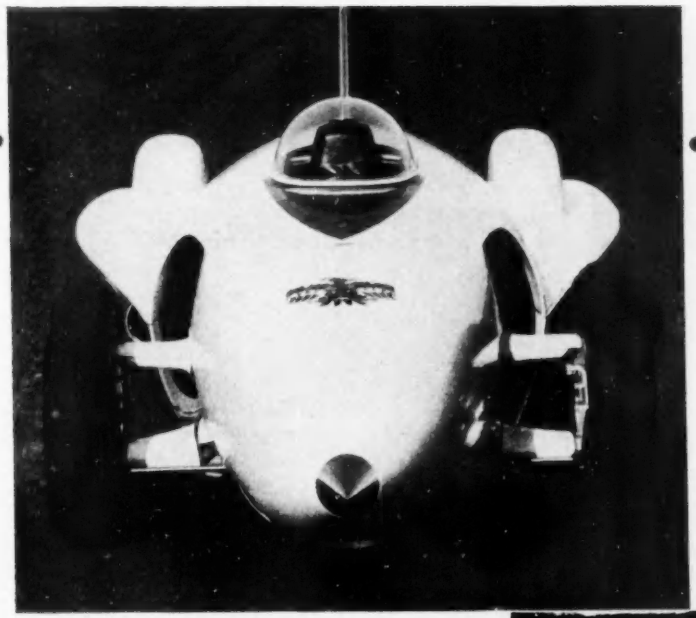
The car has a long cylindrical body with a needle point nose, which tapers back to a large circular exhaust orifice at the rear resembling that of a jet plane. The aircraft motif is carried further by a plastic bubble fitting over the driver's cockpit, delta wings extending outward and sweeping back from the midsection of the body to form a horizontal fin encompassing the rear wheel housings, and a high vertical fin at the rear to give directional stability to the car. The entire body is made of fiber glass reinforced plastic. Bomb-shaped air scoops are suspended beneath the wing to provide cooling for the transmission oil cooler and the exhaust gases.

The power unit consists of two mechanically independent components—a gasifier section consisting of a compressor and turbine, and a power turbine linked to a two-speed transmission which provides drive to the rear wheels through universal joints connected to short lateral stub shafts. The entire unit is integral in that it is built on a framework which can be lifted from the chassis in one piece after it is unbolted and universals on either side of the transmission disconnected.

The turbine develops 370 hp at 26,000 rpm of the forward turbine and the power turbine running at half speed of 13,000 rpm. In operation, intake air is raised to more than 3½ times atmospheric pressure in the compressor before entering twin combustion chambers where kerosene is burned to raise the gas temperature to approximately 1500 F. The gas passes through the gasifier turbine which powers the compressor, since both are fixed to the same shaft, and is funneled to the power turbine that drives the rear wheels through the transmission. A 35-gal fiber glass plastic fuel tank is located in the nose of the car.

There is no mechanical clutch or other means to disengage the power turbine from the transmission. Consequently, when the engine is idling, it is necessary to apply the wheel brakes or use airplane type wheel chocks to prevent the vehicle from moving. Lubrication of bearings in the power unit is provided by a pressure system, including an oil cooler.

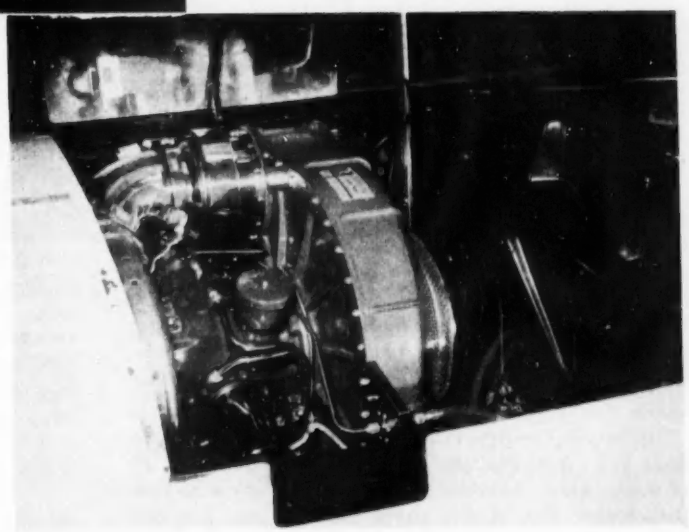
Total weight of the complete power and transmission unit is 775 lb, resulting in two lb per horsepower ratio for the engine, about one-third of that attained with conventional engines. The weight of the complete car is seven lb per horsepower. The entire engine and



. . . Has GAS TURBINE ENGINE

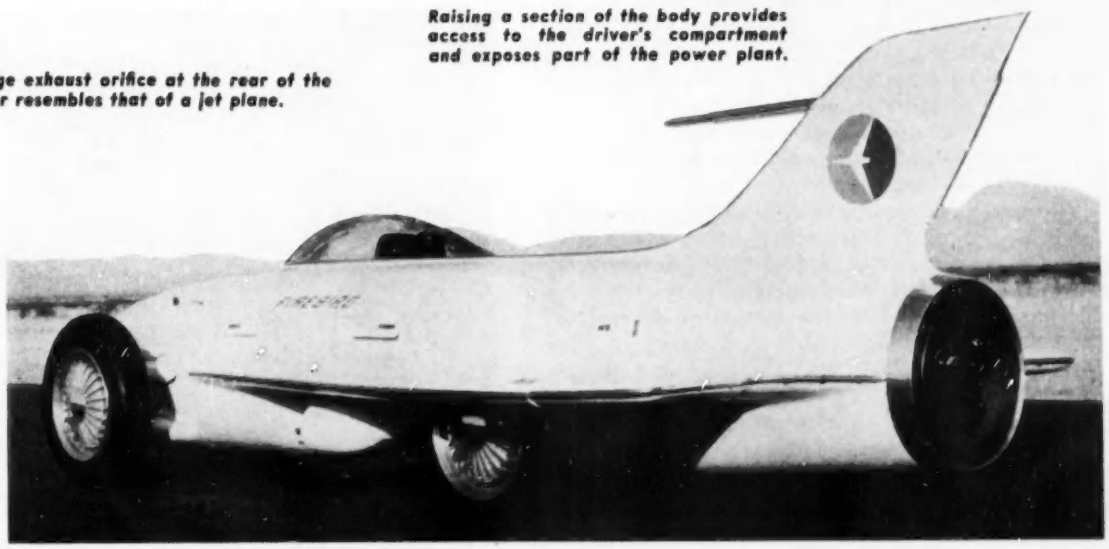
transmission unit fits into a space 63 in. long, 26 in. deep and 32 in. wide. A new high-temperature alloy developed by General Motors is used in both the gasifier and power turbine blades.

Another unusual feature of the car is airplane type brake flaps on the trailing edge of the wings. These are controlled electronically at the steering wheel through aircraft type actuators. Wheel brakes are unconventional in that they are located outside the wheels for improved cooling. (*Turn to p.* 102)



Raising a section of the body provides access to the driver's compartment and exposes part of the power plant.

The large exhaust orifice at the rear of the car resembles that of a jet plane.



Many General Purpose Machines Used to Produce Wright Engines

By Joseph Geschelin

DURING the past year Chevrolet has been producing two models of Wright aircraft piston engines at the Chevrolet Aviation Engine Plant in Tonawanda, N. Y. The program started in 1952 with the manufacture of 2700-hp R3350-26W engines, then added the 3500-hp R3350-85 turbo-compound model early in '53 under license from the Curtiss-Wright Corp., Wright Aeronautical Division, in conformity with Wright design.

Not only are the big radial engines a complex of design detail and manufacturing procedures but they have, in addition, the complication of an enormous number of parts of all sizes. For example, the R3350-85 engines contain 19,632 individual parts, not counting the carburetor, which has more than 900 pieces, and the coils, wiring harness, two distributors, and two magnetos. The R3350-26W engine has 18,100 different parts.

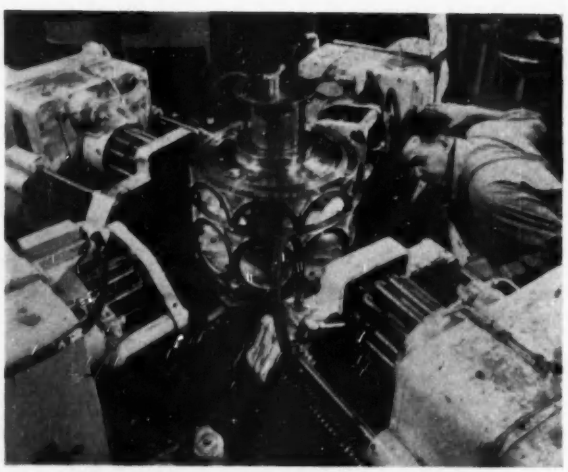
To handle the program effectively Chevrolet draws upon 360 supplier plants located in some 20 states, 10 of these being Chevrolet plants. The Aviation Engine Div. makes 138 of the parts that go into the two engines while 10 other Chevrolet plants contribute 498 different parts, a total of 636 parts made by Chevrolet. The suppliers, in turn, make 1260 other parts. In effect, therefore, the engines that are assembled and shipped out of the Tonawanda plant are the product of teamwork on the part of many plants and many specialists, funneling their contributions to the aviation engine facility.

The problem of building a large radial piston engine can be seen in proper perspective only by viewing the manufacturing facilities at first hand. Not only the variety of parts but the complexity of work routing and quality control for each component demand extensive manufacturing facilities and manpower. The best evidence of this is that the enormous aviation engine plant with its 733,000 sq ft of productive floor space can handle the manufacture of but 138 parts, the remaining floor space being required for assembly, testing, packing, and shipping.

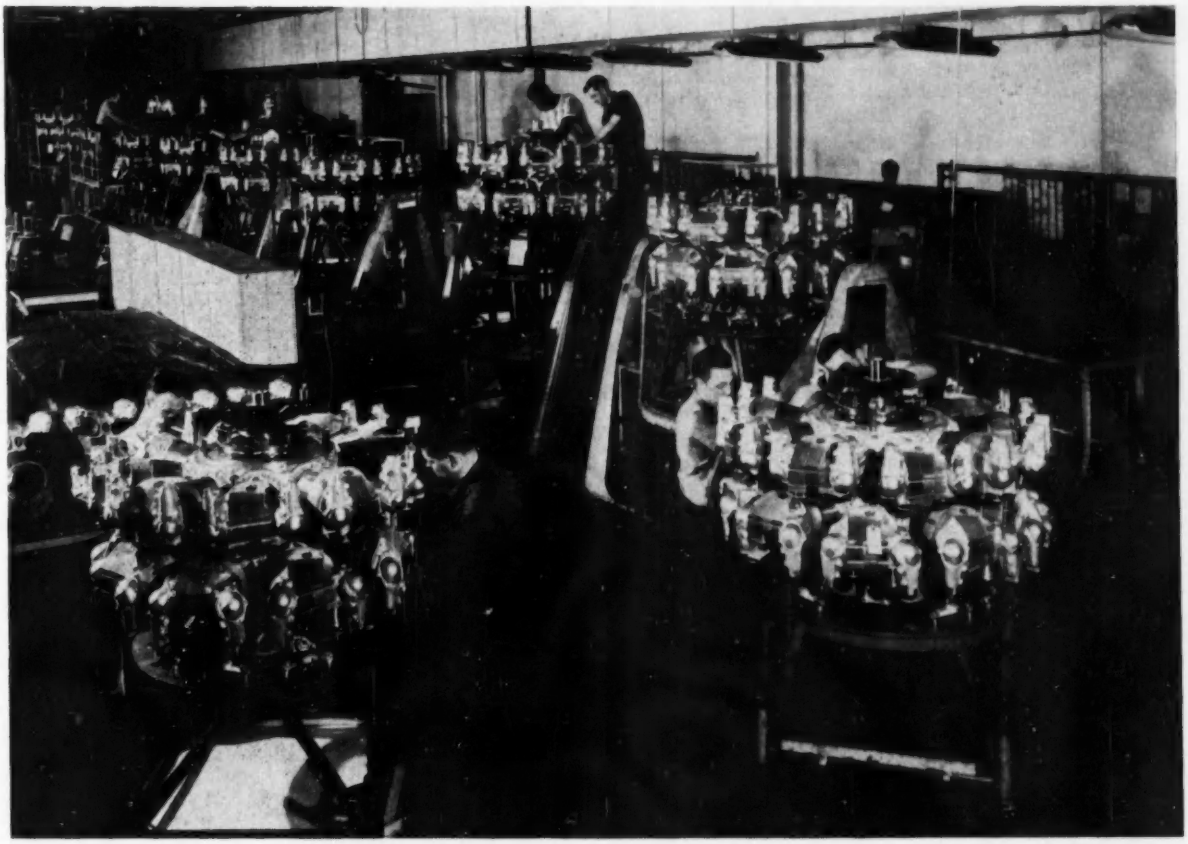
Since the engines are required in a relatively limited volume, as compared with the enormous quantities demanded during WWII, it was found expedient as well as economical to employ general purpose machine tools rather than single purpose equipment. Hence the major items of machinery consist of radial drills, standard milling machines, general purpose grinders, P & J and Foster heavy duty turret lathes, Bullard Cutmaster and vertical turret lathes, etc. Nevertheless, here and there are found single purpose machines such as Cincinnati multiple-head Hydro-Tel mills for finning and Keller profiling machines for special operations.

Faced with this profusion of parts and hundreds of detail operations on most parts, we have resorted to a pictorial presentation featuring highlights of but a few of the major or unusual operations. And that is the purpose of this article.

Those who followed aircraft engine production in WWII have not forgotten that apart from meticulous quality control and exacting finish of each individual part, the major problem is that of removing an enormous amount of metal in the form of chips and turnings from the gamut of castings and forgings. In fact this requirement alone is responsible for the large number of stages involved in the machining of individual parts. The Wright engines discussed here depart even further from the conventional pattern by



Here is the multiple-head, multiple-spindle single purpose Buhr machine for drilling and tapping bolt circle holes in the crankcase assembly.

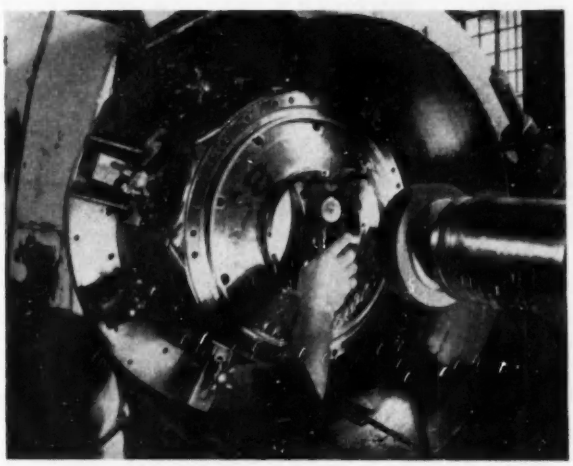


Start of final assembly of radial engines to produce "green" engines for the test cell schedule. As shown, the engines are assembled on enormous trunnion type fixtures which are moved from station to station on a power driven floor conveyor.

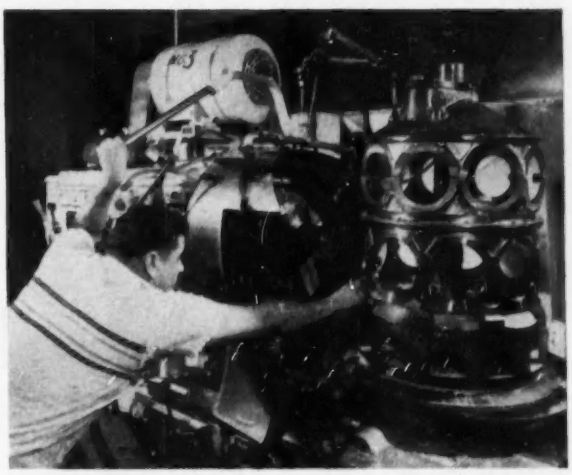
the employment of a crankcase made of four forged steel sections instead of the usual light metal sections.

To be more specific and to visualize the amount of metal removal more closely, consider the following comparison of finished weight and rough weight for a number of selected elements.

Consider first the steel crankcase sections. Total weight of the four steel forgings as they come from



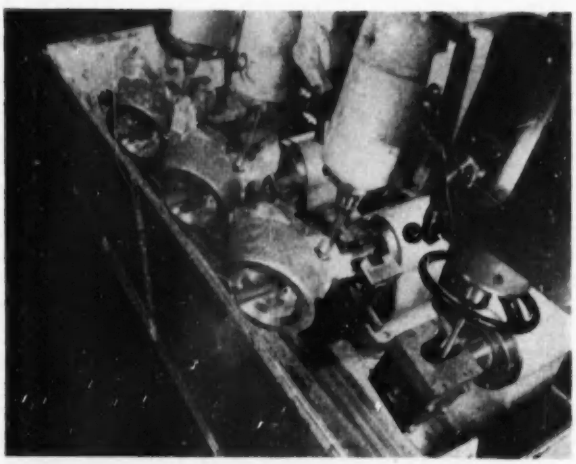
Finish-grinding of axial bores in the complete four-section crankcase assembly is done in this setup in outsized Bryant internal grinders.



Boring and facing cylinder bores in the huge, four-section, forged steel crankcase assembly. As shown here, these machining operations are performed in Foster lathes

After the aluminum fins have been swaged securely on the cylinder barrel, the entire section is machined to proper size and form, by means of a wide shaving tool, while chucked eccentrically in a Lodge & Shipley Duomatic lathe.

the dies is 1074 lb. As received at Chevrolet's Tonawanda plant these forgings weigh a total of 740 lb. After machining and finishing, the four sections weigh 170.5 lb on the average. Rough machining and grinding removes 334 lb of metal before the steel sections reach the Tonawanda machine shops. Then follow the



Three-head Cincinnati HydroTels have been adapted for the operation of fairing the ports in cylinder heads, performing this intricate job in one setting. This is known at Tonawanda as the "rock-and-roll" operation, the work being "rolled" while the cutters "rock", guided by the master tracer attachment at the extreme right.

Hot and cold fit of cylinder head to barrel. The head, heated to 900 F, is set in the fixture as shown while the barrel, chilled by dry ice in the foreground to minus 100 F, is quickly screwed into place. At the same time other smaller parts are fitted into the hot head to complete this stage of assembly.

hundreds of detail operations that whittle the assembly to a mere 170.5 lb. But this entails removal of about 570 lb of tough steel by turning, boring, drilling, grinding, and other operations. In the final analysis, the manufacturing process has to remove the staggering amount of 903.5 lb of steel in converting the rough forgings into a finished crankcase assembly.

Similarly, the aluminum cylinder head forgings, weighing about 95.45 lb in the rough, are reduced to around 34.5 lb in the finished form. This involves the removal of 61 lb of aluminum in the machine shop.

The steel cylinder barrel forging, in the rough, weighs 34.4 lb; when finished it weighs but 12 lb. That implies the removal of some 22.4 lb of tough steel in the form of chips. Incidentally, in this case, roughly 65 per cent of the forging weight is returned to scrap in the form of chips.

Another example of heavy metal removal is found in the case of the three-piece crankshaft assembly. In the rough the three forgings weigh about 325 lb; when finished, the assembly weighs but 142 lb. This involves the removal of some 183 lb of alloy steel from the three sections.

In view of the enormous amount of metal removal required in aircraft engine practice, it is important to note that experience over the years has shown that it is necessary to use large forgings in order to assure best possible quality of finished parts.

As mentioned earlier, the treatment in this article will be largely pictorial. However, a few of the operations will be described in more detail. For example, there are the four-spindle Cincinnati Hydro-Tel for handling the finning operation on cylinder heads, more or less familiar to our readers. In addition, Chevrolet has a battery of three-head Hydro-Tels for profiling the streamlined intake and exhaust ports. Called "rock-and-roll" machines, they have a unique cycle in which the work as well as the tool describes a distinctive three-dimensional pattern, controlled by suitable cam action to produce the nicely streamlined ports.

The steel cylinder barrel, unlike conventional designs, does not have integral fins. Instead, the barrel is serrated and special aluminum fins are installed in the grooves and pressed into place. Later on these fins are machined to conform to the geometry of the fins cut in the cylinder head. This is done, as illustrated, by mounting the barrel eccentrically in a Lodge & Shipley No. 3A Duomatic lathe and turning the fins with a wide shaving tool.

Several special machines, besides those mentioned earlier, are found on the crankcase line. Because of the large number of holes in the crankcase assembly, the use of single purpose machines is practically imperative. Illustrated here is a multiple-head Buhr machine for drilling the bolt circle for cylinder barrels. There is another multiple-head Buhr machine for reaming and tapping about 378 holes in the crankcase assembly. It may be of interest to note that the four piece crankcase assembly has a total of 768 holes, including 458 tapped holes.

Another noteworthy operation, illustrated here, is

(*Turn to page 86, please*)

Finish-grinding of pins on the crankshaft assembly is handled in this big Landis grinder. The operation is extremely exacting—holds pin diameter to plus or minus 0.0005 in.; and 0.0004 in. for parallelism.

Nearing completion, the nose piece of the Wright engine undergoes inspection on this fixture which carries a total of 19 dial gages designed to check the bores and mating face for concentricity and parallelism.

TABLE I *Mechanical Properties of Some Reinforced Plastics Laminates.*

Laminate Reinforcement—Resin	Resin Content, % by Weight	Ultimate Tensile Strength 1000 psi	Tensile Modulus of Elasticity 10^6 psi	Ultimate Compressive Strength 1000 psi	Ultimate Flexural Strength 1000 psi	Flexural Modulus of Elasticity 10^6 psi	Specific Gravity
Glass Fabric 181—Polyester...	38	40	3	35	55	3	1.8
Glass Fabric 128—Polyester...	38	40	2.7	25	53	2.7	1.8
Glass Fabric 143—Polyester...	34	77	5.5	50	100	5.5	1.8
Glass Fabric 143—Polyester*..	35	55	3	40	70	3	1.8
Glass Fabric 181—Epoxide....	30	55	3.5	70	80	3.5	1.8
Glass Fabric 181—Phenolic....	30	30	2	25	35	2	1.7
Glass Fabric 181—Silicone....	30	35	2.5	40	55	2.5	1.6
Glass Mat—Polyester.....	50	20	1.5	25	35	1.5	1.7
Cotton Fabric—Phenolic.....	30	12	1.3	33	22	1	1.3
Cotton Fabric—Melamine.....	30	12	1.3	30	18	1.4	1.4
Paper—Melamine.....	40	14	.....	28	14	.....	1.4
Asbestos—Phenolic.....	30	15	2	20	24	2	1.3

* Laminate is cross laminated. All other glass fabric laminates are parallel laminated.

Structural Plastics for Advanced

By Domonick Rosato
Wright Air Development Center

REINFORCED plastics have been used in aircraft for many years primarily where electrical requirements do not permit the use of metallic materials. In recent years they have been used in many other applications. The present importance in aircraft of reinforced plastics is indicated by the fact that the operation of modern aircraft would be seriously hindered without their use. Advancement in piloted aircraft and missiles is dependent to a large degree on the satisfactory development of structural plastics to meet the changing requirements and the more severe service conditions. The designer is confronted with difficult problems brought about by aerodynamic heating of the materials, and highly critical structural weight of increasing large aircraft.

Today, reinforced plastics for aircraft structural applications consist primarily of laminates made up of glass fabric or glass mat with polyester type resins and conforming to Specification MIL-P-8013.

Laminates are fabricated to shape at relatively low pressures of 10 to 200 psi and cured at temperatures from 160 to 300 F. Relatively high tensile, compression and flexural strengths are obtainable in these laminates of low specific gravity. Although varying physical properties may be obtained depending on the type of glass reinforcement used, the resin content and curing conditions, properties typical of those used in aircraft are: Ultimate tensile strength 50,000 psi; ultimate compressive strength 35,000 psi; flexural strength 55,000 psi and specific gravity of 1.8. The potential structural efficiency is unfortunately drastically reduced by the relatively low modulus of elas-

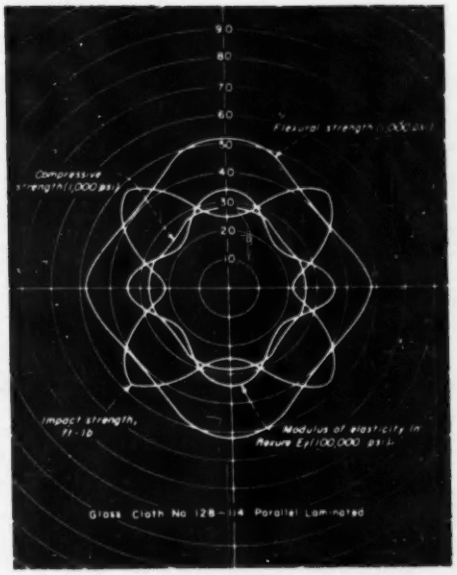
ticity of these materials which is approximately 2,700,000 psi. In comparison magnesium alloys with an almost identical specific gravity have a modulus of 6,500,000 psi. Research and development to increase the modulus of elasticity of plastics have not remedied this undesirable characteristics.

The obvious solution in utilizing these laminates in aircraft primary structures has been to stabilize the material so that buckling does not occur until an appreciable portion of the compressive strength can be developed. This stabilization is possible by the use of sandwich construction. Two high strength outer faces of laminates are separated and supported by bonding them to a much thicker and very light core. The core must have only the necessary low strength and rigidity in tension, compression and shear to adequately support the face materials to a high stress level. Cores of suitable physical properties range in density from five to 20 lb per cu ft.

These plastics are being used primarily in nonstructural and secondary structural parts such as radomes, radio antenna housings, air intake ducts, hot air ducts, fairings, fuel tank backing boards, seats, containers, photographic equipment, control panels, tabs, and fin and wing tips.

Test Results

Short Time Test—Typical properties of laminates are shown in Table I and Fig. 1. The data presented show how the laminates are influenced by the type and direction in which the reinforced agents are positioned. The designer must guard against stresses to



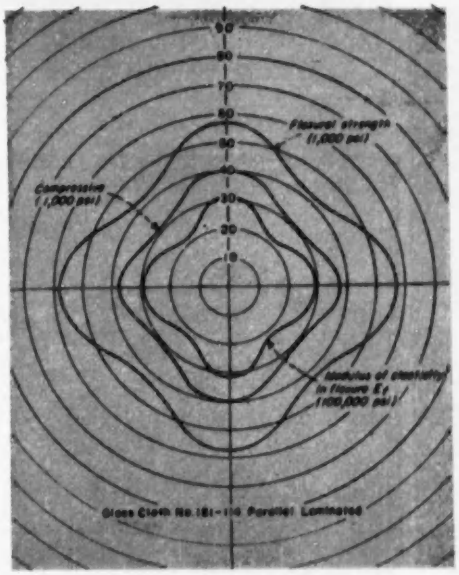
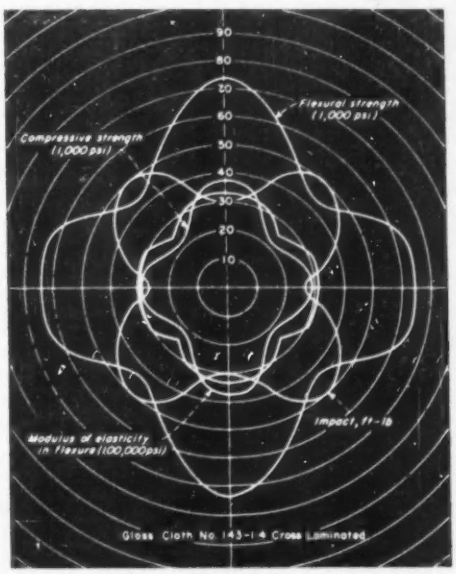
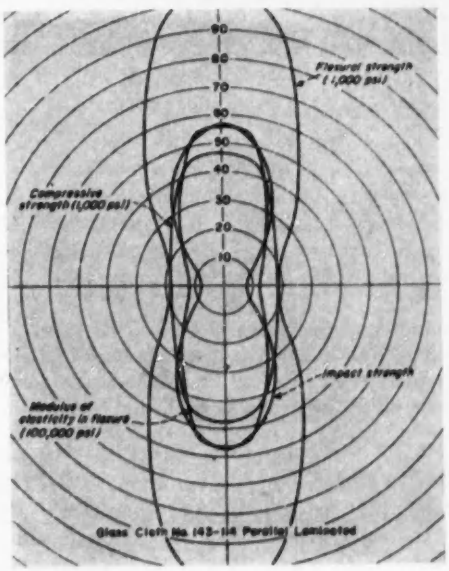


FIG. 1

These four graphs show directional strength properties of laminates

Types of Aircraft


Compressive strength (1,000 psi)
Flexural strength (1,000 psi)
Impact, ft-lb
Modulus of elasticity in flexure (100,000 psi)
Glass Cloth No 143-114 Cross Laminated


Flexural strength (1,000 psi)
Compressive strength (1,000 psi)
Impact strength
Modulus of elasticity in flexure (100,000 psi)
Glass Cloth No 143-114 Parallel Laminated

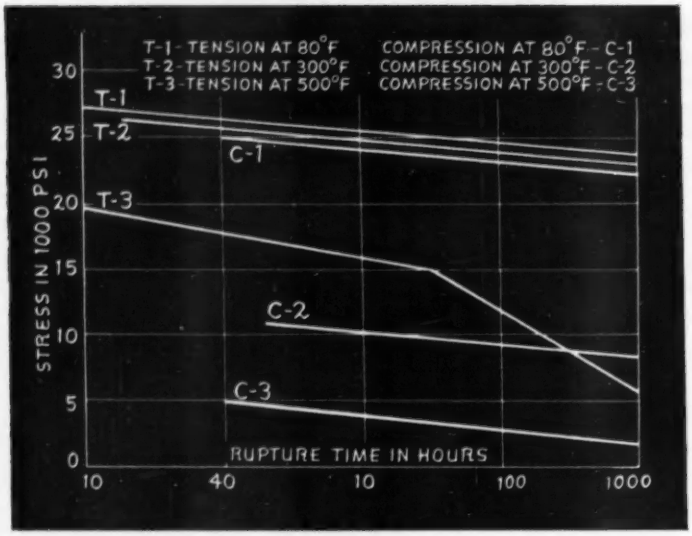


FIG. 2

Stress-rupture curves with time, for three temperatures

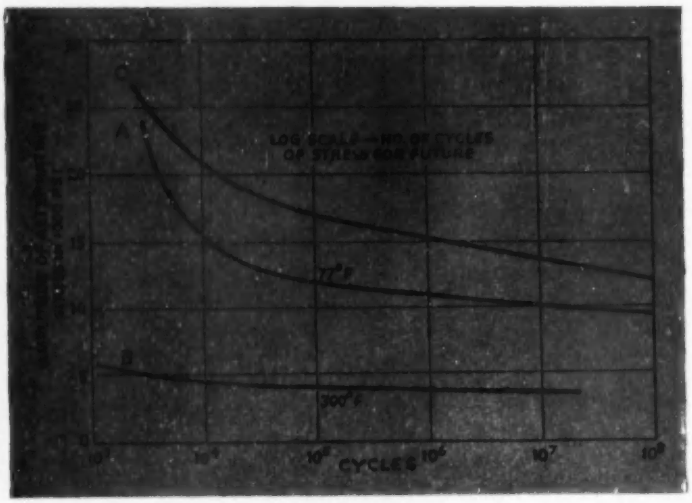


FIG. 3

Fatigue curves

which this particular construction is sensitive. These include shear stresses in the plane of the laminate and tensile stresses perpendicular to this plane. Such stresses are often introduced through fitting and attachments.

Laminates made with a bi-directional fabric such as the standard type of satin weave or some of the square woven fabrics, have approximately equal strengths in the warp and filled direction of the fabric when the fabrics are either parallel or cross laminated. When fabric is cross laminated the adjacent piles are positioned with a 90-deg angular rotation. When fabricating laminates using type 143 unidirectional glass fabric the polor graphs show the effect of laminating direction. With glass fiber mat reinforcement, the polor graphs would show an approximate round strength pattern.

It is to be noted that in Table I the epoxide resin type laminate has exceptional high strengths. Up to date only certain epoxide resins have produced these superior laminates.

The data presented are based on tests of specimens from flat panels; it is not to be expected that the values for flat panels will necessarily be typical of structural curved parts.

Long Time Test—Stress-rupture tests have been conducted on typical glass fabric type 181 with polyester resin laminates. Typical curves are shown in Fig 2 for specimens at room temperature, 300 F, and 500 F.

The tensile and compressive stress-rupture curves at room and elevated temperatures are very flat, indicating not much decrease in rupture stress with time to failure. However, the stress-rupture values are very substantially lower than the corresponding short time static properties as shown in Table I. The tensile and compression creep rates of these laminates were found to be extremely small or practically nil for tensile loading up to approximately 1000 hr exposure. Initial loading produces a deformation after which there is practically no creep either at room or elevated temperatures until failure. Failure occurs abruptly. Compressive loading produces a slightly higher creep rate than the tensile loading. For instance, at 300 F with a compressive load of 10,000 psi the minimum creep rate was 0.0005 per cent per hr, the initial deformation being 0.33 per cent and the final deformation being 0.54 per cent.

Fatigue—A typical fatigue S-N curve at room temperature is shown in Fig. 3, A and B, for unnotched rotating beam specimens with ¼-in. necked down sections rotating at approximately 6000 rpm. The laminate used conformed to Specification MIL-P-8013. The fatigue strength at 10 million cycles decreased 67 per cent with increase in temperature from 11,000 psi at 77 F to 3500 psi at 300 F. Also the slope of the S-N diagram decreased with increase in temperature. At 77 F the fatigue strength decreased 25 per cent from 100,000 to 10 million cycles whereas, at 300 F the decrease over the same interval of cycles was only 17 per cent.

A typical fatigue S-N curve at room temperature is shown in Fig. 3, C, for unnotched axial loaded specimens with ½-in. necked down sections. In general the fatigue strength at 10 million cycles of an unnotched laminate specimen in axial loading, when tested at standard conditions with a mean stress of

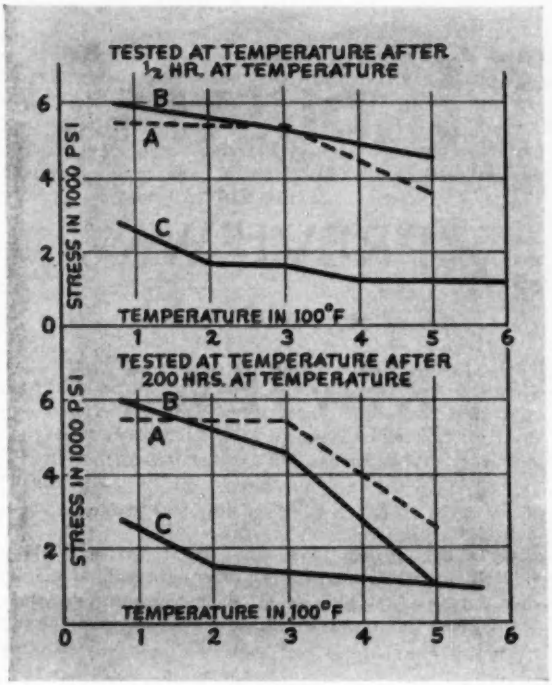


FIG. 4

Temperature effect on flexural strength

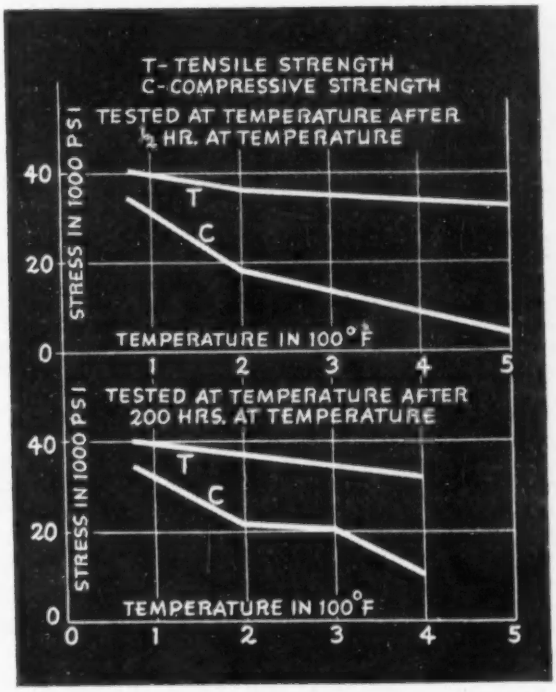


FIG. 5

Temperature effect on tensile and compressive strength

zero, is approximately 25 per cent of the static or short time tensile strength. A notch in the specimen reduced the fatigue strength at 10 million cycles only approximately 4 or 5 per cent.

Low Temperature—Typical polyester resin-glass fiber laminates conforming to Specification MIL-P-8013 have been evaluated at temperatures as low as minus 320 F. Impact strengths of notched specimens are practically the same at this low temperature as at room temperature. Other mechanical properties such as tensile, compressive, flexural, and fatigue are higher at low temperature than at room temperature. It has also been found that rapid cycling between these temperature extremes of flat sheet specimens containing various types of notches does not produce any cracking or warping of the laminate or crazing of the thin layer of surface resin.

Elevated Temperature — Development has been concentrated on elevated temperature resistant low pressure laminating resins useful in the temperature range of 300 to 600 F. In Figs. 4 and 5 are presented strengths which may be expected from polyester, phenolic, and silicone resin type glass fabric (181) base laminates over the indicated temperature range. These resins are being used quite extensively in experimental and production of aircraft parts.

Preloading—Most of the laminates when loaded in tension, produce a stress-strain curve with initial and secondary values of modulus of elasticity, and stress

(*Turn to page* 162, *please*)

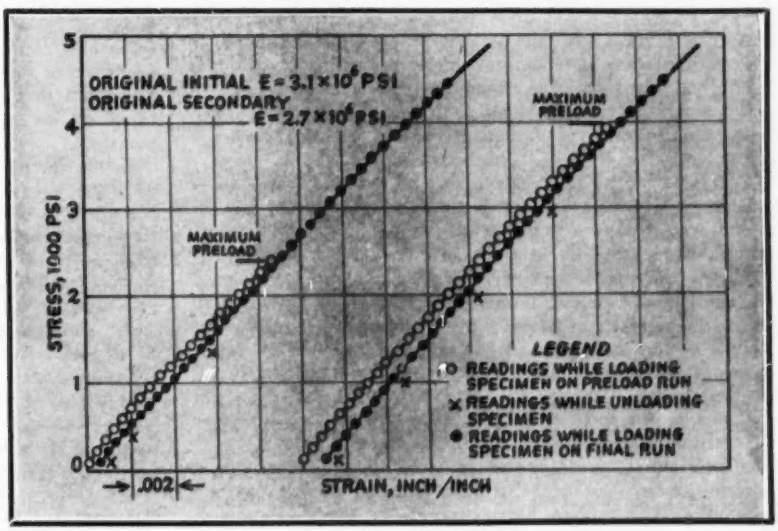


FIG. 6

Preloading effect on tensile strength

INDUSTRY PREVIEWS and REVIEWS

PETROLEUM

Another All-Time Peak

Domestic demand for petroleum products set another all-time peak in 1953, the American Petroleum Institute reported in its year-end summary of the U. S. oil industry's operations and accomplishments over the past 12 months.

The increase over 1952 is estimated at 4.6 per cent, it was announced by API president, Frank M. Porter. He said this is the 11th consecutive year that domestic demand had exceeded that of the preceding year. The industry encountered no difficulty in satisfying this increase because of its constant program of expansion and development.

Porter expressed belief that 1953 capital expenses were of record-breaking proportions. He said the Institute did not make a survey of its own this year, but that industry leaders, authoritative trade journals and banking circles alike agreed that capital expenses probably will exceed $4 billion in 1953.

He said the industry's total for capital expenditures since the end of World War II alone is well over $20 billion.

In order to maintain these supplies and services the oil industry must keep substantial inventories of crude oil and finished products "on the shelf" permanently. Refining, pipe line, transportation and other facilities that must be kept filled and moving constantly is gasoline, home heating oil and other products if they are to be available when and where they are needed.

Sixty-five per cent of the industry's crude oil inventories, 40 per cent of its light products and 42 per cent of its residual fuel oil are unavailable for sale continuously, because of this factor. The value of crude oil and four major products tied up constantly in this process is in excess of $1 billion. This represents only the value of the crude oil based upon the average price, and, in the case of products, the wholesale prices of the individual products. It does not include any charges for gathering, transportation, handling, etc., he said.

All along the line, U. S. Oil men compiled a variety of new operating and preparedness records in 1953, Porter stated.

Production of liquid petroleum, natural gas and oil products surpassed all previous peaks. Refining capacity was expanded substantially to meet increased demand and to provide a reserve "cushion" for national defense. The number of wells drilled during the year reached record-breaking levels, despite spiraling costs and heavy financial hazards. Only by drilling more and more wells can the industry and the American people be assured of adequate petroleum supplies now and in the future.

Domestic demand for 1953 is estimated at two billion 781 million barrels—up 116 million barrels over 1952. Domestic supply is estimated at two billion 608 million barrels, an increase of 94 million barrels. Of the latter two billion 363 million barrels represent crude oil, and the remainder natural gas liquids.

Domestic demand averaged seven million 619 thousand barrels a day during 1953, while total demand (which includes exports) averaged more than eight million barrels a day, for the first time in U. S. history. For domestic demand alone this meant an increase of more than 300,000 barrels a day.

RUBBER

1954 To Be One of the Best Years

The year ahead shapes up as one of the best in the history of the rubber manufacturng industry, according to the Rubber Manufacturers Association.

In the year just ending, rubber consumption hit a record-breaking 1,341,000 long tons. Industry statisticians estimate that 1954 consumption will be only slightly off this figure.

Replacement passenger tire sales in 1954 are expected to exceed the 47.5 million sold in 1953. Production of belting and hose and many other mechanical rubber goods is expected to equal the record output of 1953 on the strength of expansion of productive facilities in other industry. The foam rubber market continues to grow.

These growth items among upwards of 40,000 different types of rubber products produced annually are counted on to substantially cushion the impact of moderate declines predicted in some industry markets for rubber parts, with the result that production of rubber goods is expected to taper off no more than five per cent over the next 12 months.

In its annual summary of the industry's activity, the association called attention to the fact that 1953 consumption of new rubber was by far the greatest in the history of the industry. The substantial rise in consumption and the tremendous increase in synthetic rubber consumption over the years is reflected in this table:

U. S. Rubber Consumption in Long Tons

	1950	1951	1952	1953
Natural	720,268	454,015	453,846	555,000
Synthetic	538,289	760,283	807,567	786,000
Total	1,258,557	1,214,298	1,261,413	1,341,000
Reclaimed	303,733	346,121	280,002	284,000

The ratio of natural rubber to total new rubber consumption in the United States has risen from 36 per cent in 1952 to 41.4 per cent on the 1953 figures. By October of 1953 the rates had risen to 44.4 per cent.

Tire and tube manufacturers, who make up the largest single rubber consuming segment of the industry, produced 100.5 million units. Of this number, 82 million were passenger car tires, 14.7 million truck-bus tires, 3.8 million farm equipment tires, airplane and industrial pneumatic tires. The following table indicates the comparison over the past four years.

	1950	1951	1952	1953
Passenger	78,598,000	65,546,000	74,341,000	82,000,000
Truck-Bus	14,156,000	17,859,000	16,070,000	14,700,000
Farm & Other	4,866,000	5,129,000	4,336,000	3,800,000
Total	97,620,000	88,534,000	94,747,000	100,500,000

The rise in demand for replacement tires is expected to offset in part the somewhat smaller demand of the automotive industry for original equipment tires which has been forecast for 1954 by automobile manufacturers. The automobile industry is also an important market for foam rubber cushioning materials.

Manufacturers of light mechanical rubber goods, molded and extruded parts, expect a moderate tapering off in demand for those products of perhaps as much as five per cent below the record levels of 1953. Principal users of these goods are the automobile industry and manufacturers of such home equipment items as refrigerators, freezers, washing machines and driers, radios, television sets and many like items.

Production of heavy industrial rubber goods, including all types of industrial hose and power belting and conveyor belting is expected to remain at or near the 1953 level. Similarly, good forward buying leads manufacturers of elastic thread to expect production at about the 1953 level.

The coated fabrics segment of the rubber industry produced about 50 million yd of finished goods in 1953 and expects to maintain about that volume in 1954. Chief users of these products are the automotive industries and the makers of protective clothing, hospital sheeting, shoes and novelty items.

Figures on factory employment in the rubber manufacturing industry are not yet available for the full year. But over the first eight months, factory employment averaged 218,600 clockcard workers. Average hourly earnings of employees in the tire and tube industry in that same period rose to a new high of $2.23 an hour. That figure does not reflect either a general wage increase or extensive fringe benefits which were granted late in the summer. These latter benefits included improved pensions, company-paid hospitalization and surgical-medical insurance for employees and their families.

Most significant single development nationally in 1953, from the industry's standpoint, was action by Congress to authorize the sale to private industry of Government-owned synthetic rubber facilities. The President's Synthetic Rubber Facilities Disposal Commission began taking bids on these plants Nov. 25, 1953. While the bid period does not end until next May 27, the Commission is unofficially reported to have received already more than 100 expressions of interest.

Negotiations, as provided under the law, will continue for a period of seven months from May 28. It will not be until after that, a review of the sales proposal by the Attorney General and a review by Congress of the Commission's detailed report on the proposed sales, that there will be final decision some time in the spring of 1955. Ultimate approval by Congress will hinge on whether the sales proposals meet the security, free competition and fair value criteria laid down in the law.

STEEL

Payroll Exceeded $3 Billion

There is no indication of a substantial setback in the near future for the steel industry, said Max D. Howell, executive vice-president, American Iron and Steel Institute. At the start of 1954, the aggregate demand for steel is still brisk although moderately reduced from the unusually high levels of a few months ago. The industry is no longer operating at or above its full capacity, but the output in tons has been high and closely related to actual orders even though production facilities are not forced to work at the highest possible speed. Because of the growth of the industry, nearly as much steel was made in September 1953 at 92.4 per cent of capacity as in September 1952, when the average was 102 per cent of capacity. As much steel could have been made at 88 per cent in 1953 as at 100 per cent in 1950.

Over the long term, the use of steel will increase with the rising demands of a growing population, new and higher living standards and the development of new products. At all times, steel producers will undoubtedly keep in mind the importance of remaining competitive with other metals and non-metals.

The companies will be alert to keeping ahead of the needs of the economy. The industry has spent well over $5 billion for new equipment and construction during the postwar years.

Meanwhile, iron and steel companies have been spending hundreds of millions of dollars to develop new iron ore reserves in this country and in Canada, Venezuela, Liberia, Quebec-Labrador and other parts of the world. Much progress also has been made toward the utilization of taconite and other low grade ores. Taconite is a hard rock with a low content of iron. When taconite is ground up, the iron minerals removed and the fine mineral particles agglomerated into pellets, a high grade material is provided for smelting in blast furnaces.

Other advances in the technology of iron and steelmaking continued during 1953 and progress was made in the conservation of natural resources. Processes for the extrusion of steel, for continuously casting steel and for recovering manganese from slag, are among the developments.

The industry's employment, estimated payroll, and average hourly earnings of wage earners rose to record high levels in 1953.

The payroll exceeded $3 billion for the first time in history. This covers wage earners and salaried employees directly engaged in the making and sale of iron and steel, but does not include employees in other phases such as mining and fabricating steel into products of steel.

The industry's average employment was higher than ever before. The average is expected to be around 685,000.

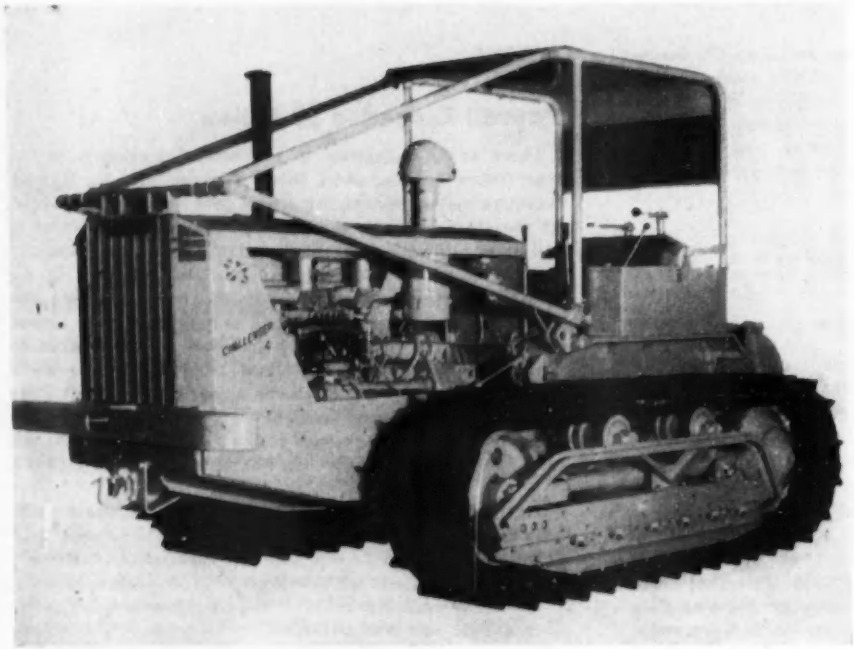
ALUMINUM

Production Up One-Third Over '52

Setting new records became a habit with the aluminum industry during 1953. New monthly records for primary production were established early in the year, only to be broken successively in later months. Likewise new quarterly records were set, and the total for the year broke the all-time record of 1952 by a wide margin.

On the basis of statistics for the first ten months, pri-

(*Turn to page* 152, *please*)



Challenger 4 powered by 150 bhp Diesel engine and fitted with timber extraction equipment. This was the heaviest machine at the show.

By David Scott

Wide Range of Engines In Tractors at London Show

LONDON, ENGLAND

CURRENT trends in the British tractor industry are a movement towards both the upper and lower ends of the power range, greater use of Diesels, and an increasing variety of crawlers on the market. These developments were noticeable at the Agricultural Machinery Exhibition held at Earls Court, London, in December. Besides going farther to meet Britain's own requirements and heralding a reduction of tractor imports, they are aimed at competing more strongly with European manufacturers—particularly in tracklayers.

David Brown has expanded its entry into the light class field with its new Model 25D four-wheeler—a Diesel version of the kerosene tractor introduced earlier this year. This 4-cyl direct-injection unit with 3½-in. bore and 4-in. stroke is rated at 31.3 bhp at 1800 rpm max. Transmission is through a three-speed, double-range gear box. Top speed of 14.8 mph makes the 25D suitable for road work. Lowest gear provides a speed of 1.46 mph at 1600 rpm.

Other David Brown tractors on show were the 30C and 30D, an earlier wheeled pair new since last year. They are powered respectively with 4-cyl kerosene and Diesel engines in the 35 bhp class. The Cropmaster 50, and Trackmaster 30 and 50 also were exhibited. These have undergone only minor changes other than in name, and are now designated simply as Models 50D, 30TD and 50TD.

Platypus is now offering its small 30 bhp crawler with a wide range of track widths and gages. The largest has 24 in. shoes spaced 54 in. between centers, with nine other combinations available down to 7 in. shoes and 31 in. track centers. The extra-wide gage model is intended for bog reclamation work, and ground pressure of under 1.5 psi is claimed. Optional engines are a Perkins P4 Diesel or a 4-cyl gasoline unit of 28 bhp rating. Drive is through a six-speed gear box, and epicyclic gear controlled differential steering provides full power to both tracks on turns.

The Bristol crawler of comparable power is now produced with eleven different combinations of track widths and centers. These range from 7-10 in. and 30-55 in. respectively. Power unit is either an Austin A.70 industrial engine which develops 22 bhp at 1500 rpm, or a 23 bhp Perkins P3.

The Brockhouse President, one of the lightest British farm tractors, is now made with a reduced

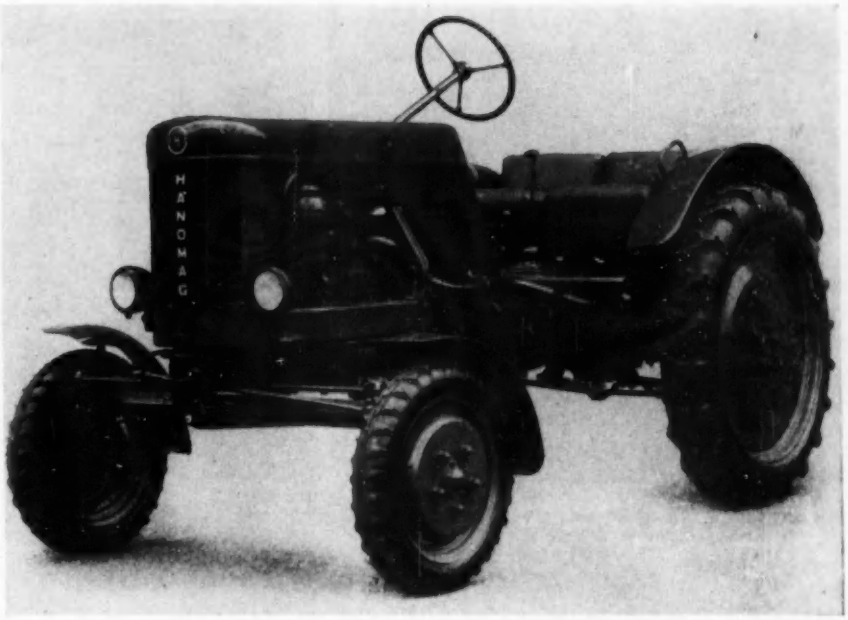
overall height for orchard or hop cultivation. Its 4-cyl Morris side-valve engine of 56 cu in. piston displacement can be supplied for either gasoline or kerosene. The chassis comprises a pair of U-section members designed to take mid-mounted implements. Although weighing only 1800 lb, the President is claimed to have unusual tractive power for a machine of its class as a result of optimum weight distribution.

Nuffield's Universal, built by Morris, is fitted with an improved 4-cyl kerosene engine with gasoline starting which is now rated at 42 bhp at 2000 rpm. A Perkins P4 Diesel also is available, and (for export only) a gasoline engine similar to the carburator unit. The tractor is offered with four wheels, with V-twin front assembly, or in tricycle form.

Ferguson's merger with Massey-Harris has not yet evidenced any change in the tractor production program of either company. Their two stands at Earls Court were adjacent, with their respective exhibits arranged to complement each other. Ferguson has pioneered in the lightweight tractor in Britain, while Massey-Harris has been concerned with heavier equipment. At the same time, it is understood that Ferguson may soon enter the heavy field with a 58 bhp machine. This will be made by The Standard Motor Co. with which Ferguson has just renewed its contract for 12 years. Current output consists of a basic wheeled model offered with gasoline, kerosene or Perkins Diesel engine of some 27 bhp rating.

The heaviest machine at the show was the Challenger 4 made by John Fowler, one of the leading U. K. crawler manufacturers. This is the most recent addition to this company's line, and is powered by a Meadows 6-cyl Diesel rated at 150 bhp at 1550 rpm. Maximum drawbar pull is given as 28,500 lb under average conditions. It has six forward and four reverse speeds. Track gage is 78 in. and plate width 22 in. Weight is 30,160 lb and ground pressure 5.77 psi. This model is intended for construction, logging and industrial work.

Smaller Fowler tracklayers are the Challenger 3 with a 95 bhp Leyland 6-cyl Diesel, and Challenger 1 powered by a 2-cyl, 2-stroke 50 bhp oil engine made by Marshall. The Mark VFA Diesel crawler is powered by a horizontal single-cylinder 2-stroke unit of 40 bhp, as is the Series 3A wheeled tractor.



German Hanomag Combitrac R12 with 12 hp, single-cylinder, two-stroke Diesel.

Design of the Turner tractor is unchanged. It is equipped with a V-4 Diesel developing 40 bhp at 1500 rpm. Turner has recently obtained manufacturing rights for the List 2-stroke Diesel developed in Austria. This is a 2-cyl supercharged engine rated at 37.5 bhp at 2850 rpm which is also made with three and four cylinders. Production is expected to start in the spring. It is intended for automobile, tractor, taxi and light truck applications.

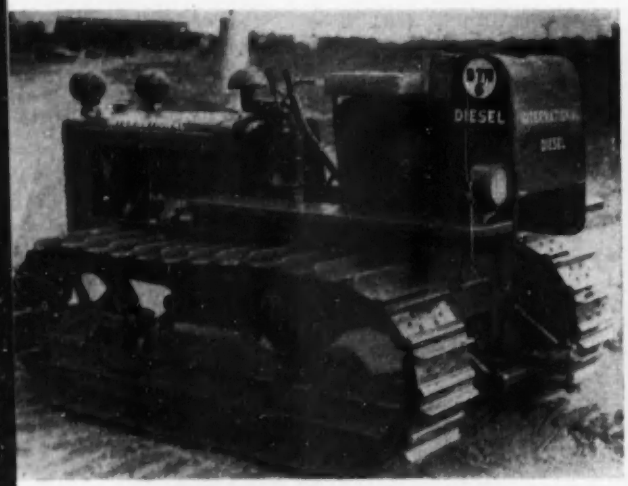
The Fordson Major, now being exported in volume to the U. S., was shown at the London exhibition with kerosene and Diesel engines in both wheeled and full-track versions. Roadless Traction Ltd. has produced a rubber jointed track for the Fordson crawler, for which lower track maintenance, silent operation and reduced shock transmission are claimed.

While production and exports of British tractors

BRITISH TRACTOR PRODUCTION AND EXPORTS

	WHEELED		TRACK-LAYING	
	Production	Exports	Production	Exports
1949	88,300	54,500	2,540	1,730
1950	117,300	82,500	2,880	2,140
1951	137,600	108,000	3,800	2,840
1952	123,000	89,000	3,400	2,060
1953*	108,000	77,000	2,950	1,800

* Based on first nine months.



International B-TD6 which was shown for the first time in Britain

Nuffield Universal M4 with improved four-cylinder kerosene engine which uses gasoline for starting

have staged a modest recovery in recent months, the monthly output rates for this year are still below those of 1952 and well under the 1951 peak. This is shown in the accompanying table. Wheeled tractors comprise all but a few per cent of the U. K. output, and some 70 per cent of these are exported. The general falling off in overseas sales has therefore had a marked effect on production.

Of Britain's three pripcipal markets, which together account for over a third of the total, shipments to Australia and Denmark have dropped while those to Sweden have remained relatively stable. An improvement in exports to South Africa, France, the U. S. and Argentina was made during the first nine months of this year as compared with the same period in 1952. But sales to New Zealand, Canada, India, Turkey, Brazil and Uruguay have declined.

Overall trend of crawler exports has been similar, although the numbers involved are small. The greatest drop has been in the largest markets, Australia and France, although this has been somewhat countered by a rise to New Zealand. Emphasis in Britain is on the production of crawlers for home use to replace imports on which it has relied heavily in the past. But this policy is not yet reflected in the trade figures, for total crawler imports during the past few years have risen sharply rather than dropped. Major suppliers are Canada, America and Italy.

While Britain's imports of wheeled tractors last year amounted to only 65 units, the figure for crawlers was 527. Caterpillar accounted for about a third of these, and at Earls Court was exhibiting the D4 together with a selection of genuine parts and sub-

(*Turn to page* 84, *please*)

Extra-wide gage Platypus 30 with 24 in. track plates. Drive is through a six-speed gear box

David Brown 25D with four-cylinder direct injection Diesel and two-speed power take-off at rear

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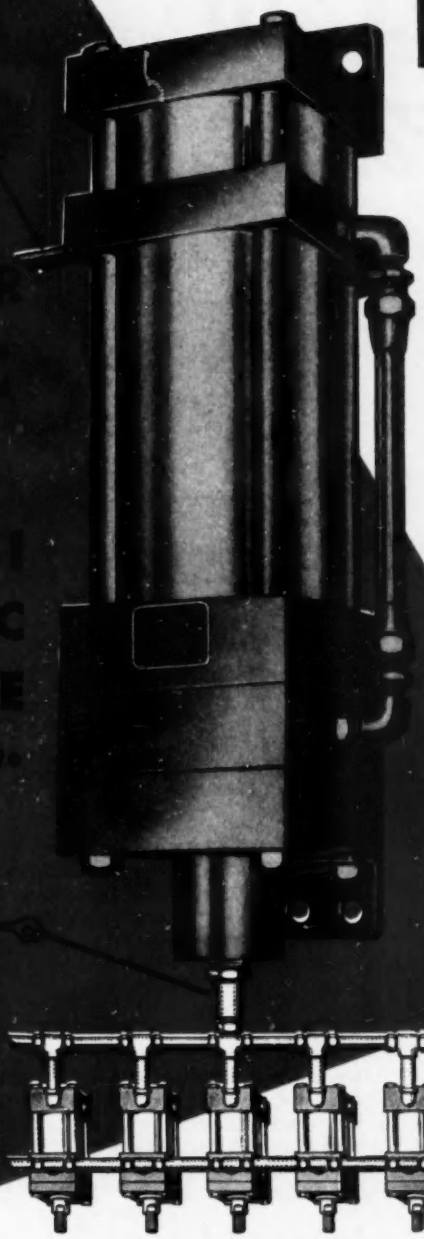
TO 2000 PSI HYDRAULIC PRESSURE

Output Range: 200 to 10,000 psi Fluid



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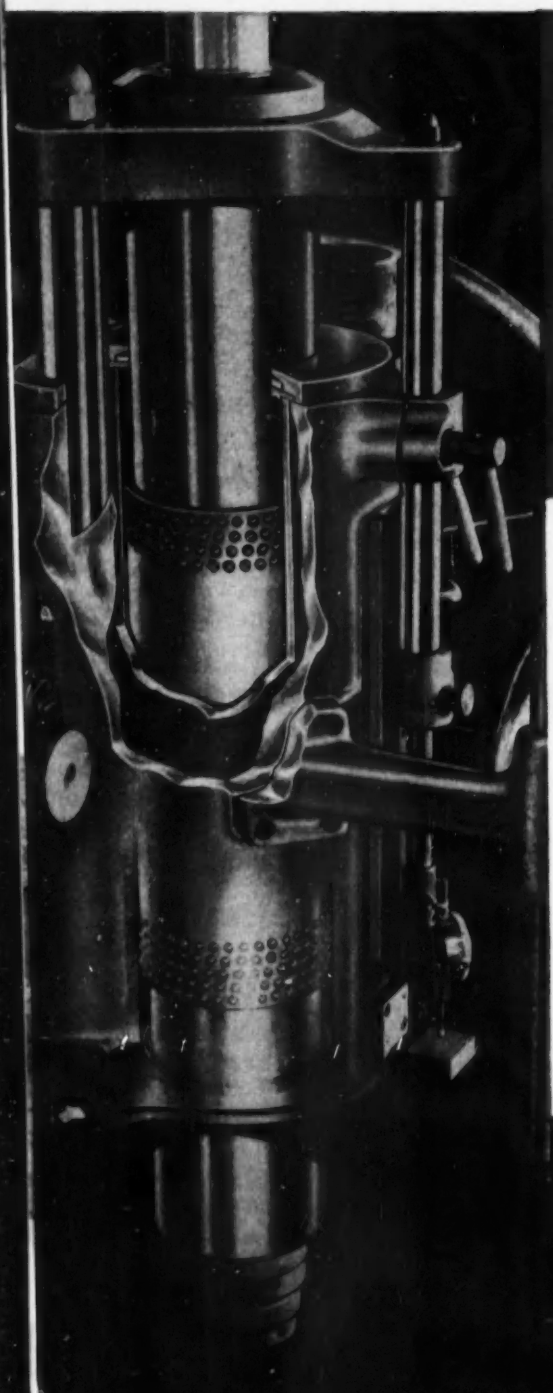

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The P&W Ball Roll Quill spindle also adds far greater versatility. Ability to resist heavy lateral pressures without deflection or wear has made it practical to provide the table and carriage of the 4E Jig Borer with power feeds. This makes it possible to perform precision milling in addition to the usual boring operations.

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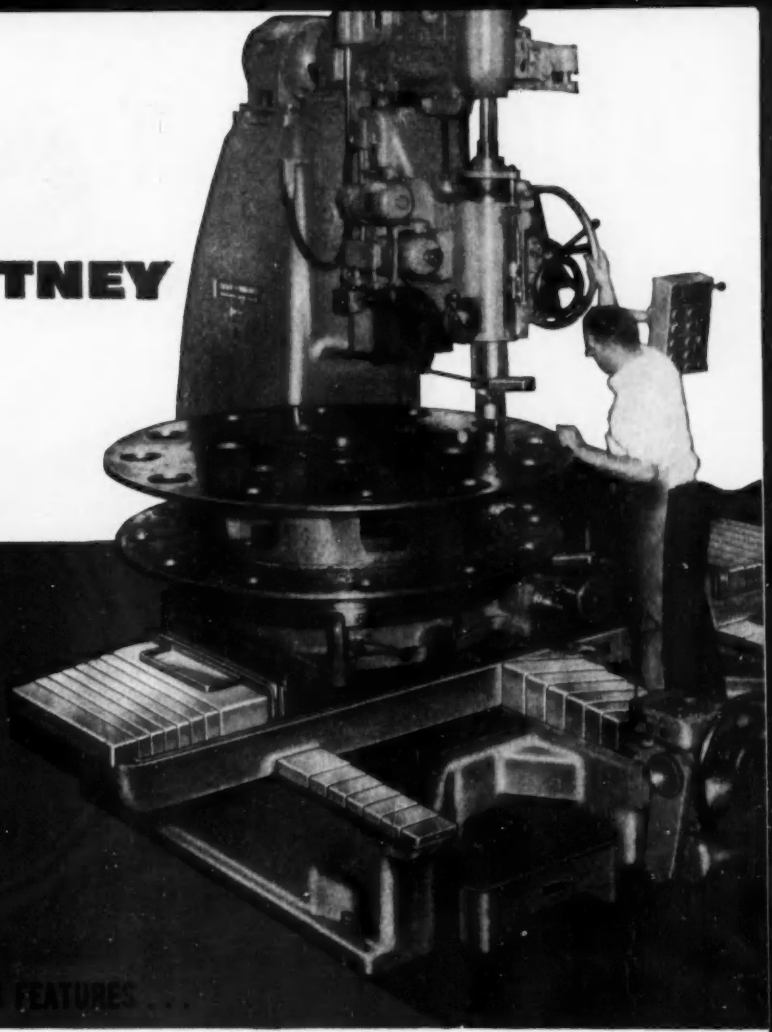
Yours with a

PRATT & WHITNEY

NUMBER **4E**

Electrolimit

JIG BORER



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- **THE NEW P&W *Electrolimit* MEASURING SYSTEM**

  This entirely new method of locating the table is fast, extremely accurate, absolutely positive and easy to use. There are no contacting surfaces and, therefore, no wear; the original high accuracy is retained indefinitely.

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  The big 36 inch by 72 inch table handles work loads up to a full 5,000 pounds. Longitudinal table travel is 60 inches; transverse travel is 36 inches. Maximum distance from table top to spindle end is 47 inches.

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- **CENTRALIZED PUSH-BUTTON CONTROL**

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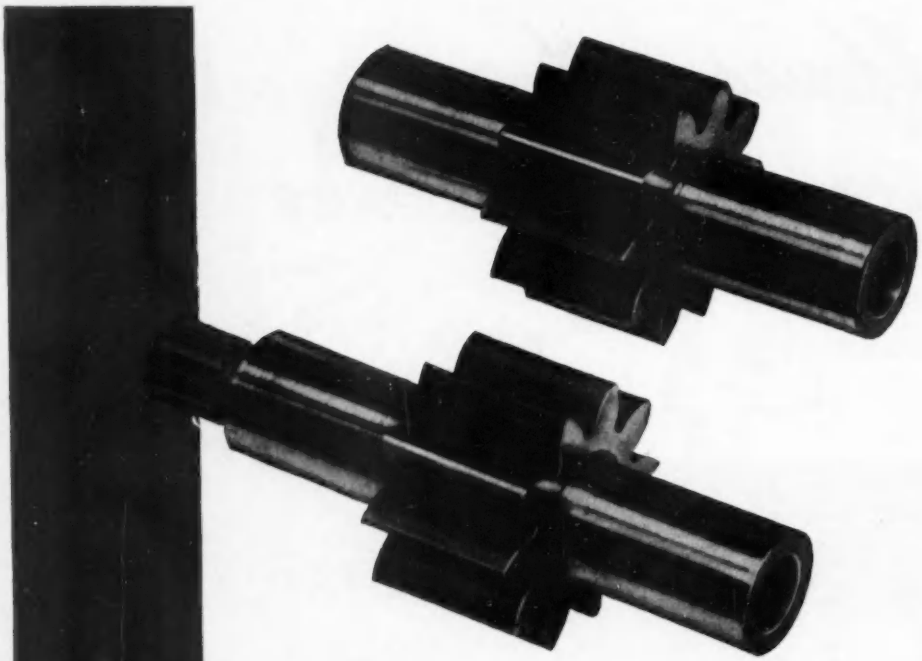

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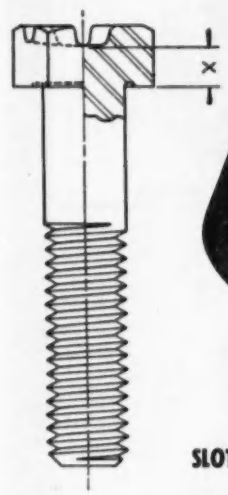
National makes the Slotted-Type "Place" Bolt in carbon or alloy steel, in any of a wide range of sizes. Write us for additional information, including our illustrated folder.



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The flexible diaphragm formed between slotted segments in the upper face of bolt head and circular recess adjacent to the shank in lower face (section X) acts as controlled spring element when head is properly wrenched against a rigid seat. Diaphragm is reinforced by the continuous-grained segment cold formed between upset slots in upper face.

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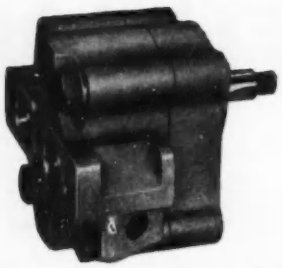
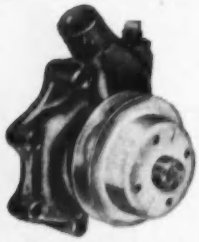


FARM IMPLEMENT PUMP



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SPECIAL PRODUCTS DIVISION

News of the MACHINERY INDUSTRIES

By Thomas Mac New

Production Equipment Reported "Good Buy" as Machine Tool Industry Looks Toward Period of More Selling Effort.

MHI Elects Officers

Last month, some 125 executives representing 70 manufacturers of materials handling equipment got together in New York for the annual meeting of the Material Handling Institute. As customary at the meeting, the annual election of officers was held by the group. Charles B. Elledge, manager of materials handling industrial sales, General Electric Co., was elected to the presidency of the association. His helpmates for the year are Walter E. Schirmer, vice-president, Clark Equipment Co., and Edward W. McCaul, secretary, Jervis B. Webb Co., who were elected as First and Second Vice-Presidents respectively.

Newly elected president of the MHI is C. B. Elledge, manager of materials handling industries sales, General Electric Co., Schenectady, N. Y.

Purchase Time for Productive Equipment

In a study recently released by the Machinery & Allied Products Institute, it is stated that productive equipment is currently a good buy in terms of price comparison of equipment with wage rates and plant building costs. To quote the report, "The ratio between equipment prices and wage rates is 23 per cent lower than in 1940 while plant building costs are currently as high relative to wage rates as in prewar years."

The decline of equipment prices relative to labor and plant is held to be significant both as an explanation of postwar industry trend toward increased mechanization and as an indication this trend will continue in the future.

Tool Orders Off—Healthy Adjustment Underway

After the record machine tool business in the last few years, the machine tool industry is entering a period of healthy adjustment with orders leveling off and with the emphasis shifting to selling rather than production, Francis J. Trecker reported to stockholders in Kearney & Trecker Corporation's annual report. He said that industry is caught in a squeeze between rising labor and material costs and narrowing profit margins and is being forced to replace obsolete and inefficient equipment with modern tools.

Mr. Trecker further reported that his company's special machinery manufacturing operation is not experiencing a let-down and that orders on hand will assure maximum production in the company's new special machinery plant well into the first quarter of 1955.

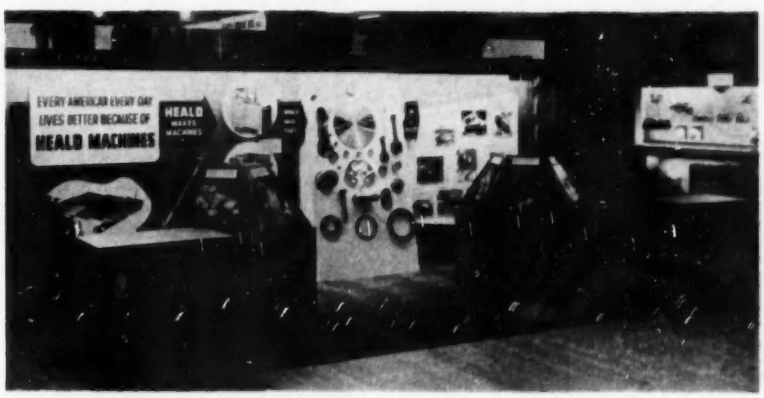
Kearney & Trecker earnings for the fiscal year ended September 30 totalled $2,005,974, only slightly under the $2,031,592 earned the preceding year. Shipments exceeded $51.7 million compared with $33.8 million in the preceding fiscal year. The company is looking forward to about $40 million worth of business for the 1954 fiscal year.

A. J. Snyder has been appointed sales manager of the cutting tool sales division of Motch & Merryweather Machinery Co. The cutting tool sales division, under Mr. Snyder's direction, represents several makers of cutting tools and also sells the cutting tools manufactured by Motch & Merryweather.

Electric Motor Maker Reports Growing Trend

J. W. Corey, president, Reliance Electric and Engineering Co., Cleveland, Ohio, stated in the company's annual report to stockholders that

(*Turn to page* 116, *please*)



At a recent industrial exhibit in Worcester, Mass., The Heald Machine Co. of Worcester had on display several products made on Heald equipment, as pictured in the illustration. A few of the other companies showing their wares were: Norton Co., Wyman Gordon Co., American Steel & Wire Div., Pullman Standard Car Manufacturing Co., and Reed Roller Thread Div.

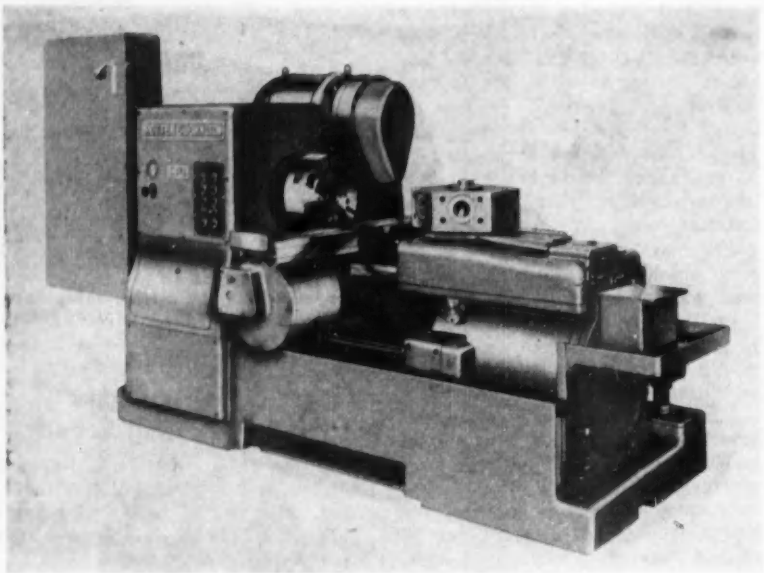
NEW EQUIPMENT PLANT • PRODUCTION

FOR ADDITIONAL INFORMATION, please use postage-free reply card on PAGE 73

Lathe is Designed for Carbide Tooling

A high powered automatic turret lathe, designated the Model 4U and designed primarily for rapid removal of metal with modern carbide tools, has been announced.

The large, six-faced turret is indexed with a geneva movement and is positioned by means of a large lock bolt. A tapered seat clamping arrangement in the turret slide gives a rigid base for the most rugged tooling. The turret slide has a travel of 12 in., of which eight in. is feed. In addition the slide is also adjustable along the base ways. The design of the turret is such that coolant may be pumped either overhead for turning tools, or through the bars for boring and drilling.



The P&J Model 4U turret lathe for carbide tooling.

An eight-in. type A-1 American Standard spindle nose has been adopted for the spindle, taking chuck sizes 10, 12, or 15 in. The spindle is mounted in heavy duty, precision Timken double taper roller bearings, front and rear. Four automatic instaneous speed changes are provided by multi-disc friction clutches electro-pneumatically controlled by adjustable dogs on a dog drum. Through pick off gears, spindle speeds ranging from 45.5 to 1177 rpm can be obtained. A large magnetic clutch and brake, designed to give cushioned starting and stopping of the spindle, allows greater flexibility in operation. These features together with a 25 hp motor enable the Model 4U to take full advantage of modern carbide tooling.

The front and rear cross slides are independent and can be easily adjusted along the base ways, resulting in unusual tooling opportunities. The slides are individually operated by large cam drums to work with any or all turret faces. A standard travel and feed of 4½ in. and in auxiliary movement of two in. travel to operate turret slide tools is provided. Six automatic feed changes permit an overall feed range of 0.002 to 0.163 in. per spindle revolution, to both cross slides and turret slide.

All machine functions, including automatic changes of speeds, feeds, rapid traverse and automatic stopping of the machine are controlled from a conveniently located dog drum.

The Model 4U has been designed such that the following attachments can be easily applied: Slow spindle speed for drill head pickup; slow spindle speed for spindle positioning; and reversing spindle for right or left hand threading with automatic tap withdrawal. *Potter & Johnston Co.*

Circle 66 on page 73 for more data

Gage Checks Gears Visually

Gear analysis can now be accomplished visually by optical gaging methods with the OGP gear analyzer. Direct observation of a magnified gear image allows inspection, analysis, and gaging of the gear under simulated operating conditions. The gear analyzer will check: Involute profile; fillet interference (or clearance); outside diameter; root diameter; pitch diameter; backlash (effective tooth thickness at standard pitch diameter, by center-distance, and "slap between teeth"); tooth to tooth spacing; modified tooth form; tapered teeth; tooth crowning; first and last contact point; and off-axis teeth.

Need for interpolative data is eliminated.

This device is said to check a wide range of gear sizes, and no master gear is required. Complete analysis of "running conditions" can be made, even when gear operates with backlash.

The OGP gear analyzer works on the following principles: The gear is viewed as it rotates in contact with—and at the correct center distance from a composite rack chart (e. g., 14

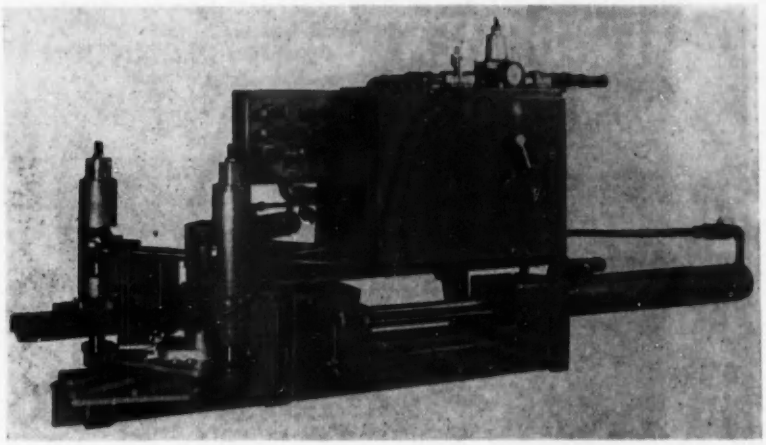
Fixture Broaches Two Non-Parallel Slots Simultaneously

An air powered horizontal broaching fixture simultaneously broaches two non-parallel slots in a die cast aluminum gear case cover.

The ⅛ by ⅛-in. slots, which are provided in the part to guide control bars, are located at a 10-deg angle to each other. The new broach fixture is said to produce the slots in a fraction of the time required by a former double milling operation. Eight seconds are required to load, broach and unload the part.

Simultaneous broaching of the non-parallel slots is achieved by an ingenious broach puller design in which each broach is attached to individual angular mounted shafts on the puller head through universal joint type yokes, as the schematic drawing shows. The yokes are mounted on their shafts with linear ball bushings that permit free sideways movements of the yokes in relation to each other.

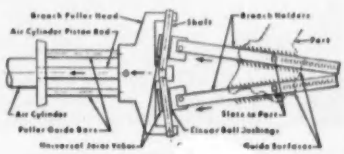
The broaches are mounted in broach holders that are guided in slides above the part. Thus, as the broaches are pulled through the angular slots, they are guided in the correct angular paths and the yoke members mounted on the puller head can spread apart on the cutting stroke and move toward each other on the broach return stroke.



The air powered National broaching fixture, which simultaneously broaches two non-parallel slots in a die cast aluminum gear housing.

To broach the two slots, the gear case cover is loaded over a locating pin and swung under the broaches against an interlocked Micro-Switch that indicates correct radial location.

With the part in correct position, the cycle start button is pressed and an automatic broaching cycle is initiated: A platform carrying the part is raised by an air cylinder-controlled rack, pinion and eccentric cam mechanism; and a spring loaded clamping plunger locator enters another hole in the part from above. An adjustable stop controlling the vertical travel of the platform provides the broach depth adjustment.



A schematic drawing of the ... ire showing how linear ball bushing, universal joint yokes, mounted on individual angular shafts on the puller head permit one air cylinder to pull the two guided broaches simultaneously across the part in angular paths.

When the platform reaches the end of the vertical travel, another switch is contacted which initiates the broach cutting stroke. An air cylinder on the end of the fixture pulls the broaches through the part. When the broaches reach the end of their stroke, another switch is actuated, the platform drops, the broach returns to its initial position, and the part is unloaded from the fixture.

Chips are removed from the broaches and fixture both during and following the broaching operation by automatically controlled air blasts.

A two-in. diam air cylinder operates the platform raising mechanism and a four-in. diam air cylinder pulls the broaches through the part. The fixture is approximately seven ft long, weighs about 800 lb. *National Broach & Machine Co.*

Circle 68 on page 73 for more data

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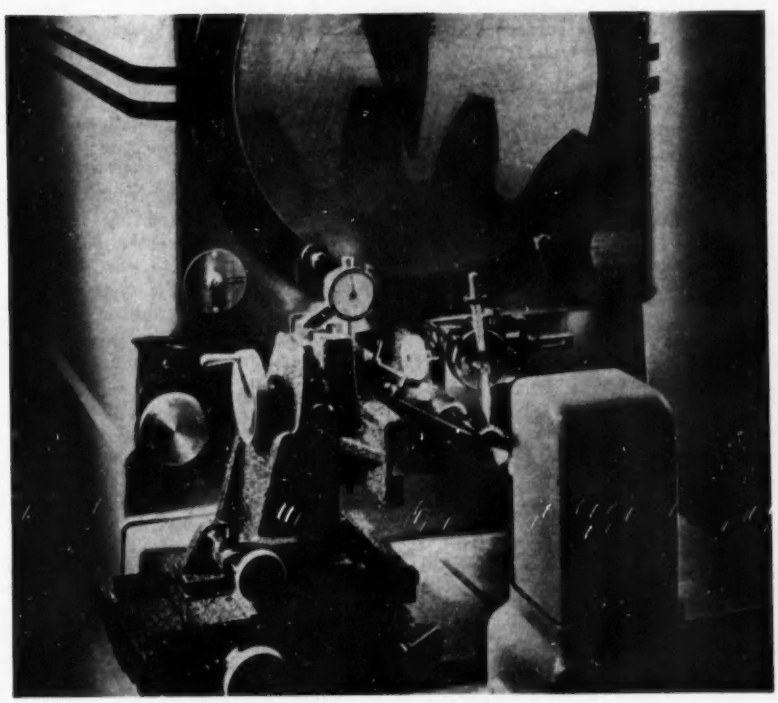
to 180 DP). Thus analysis of the gear is made by observing the runing action at a magnified projection on a Model 3 Kodak contour projector. *Optical Gaging Products, Inc.*

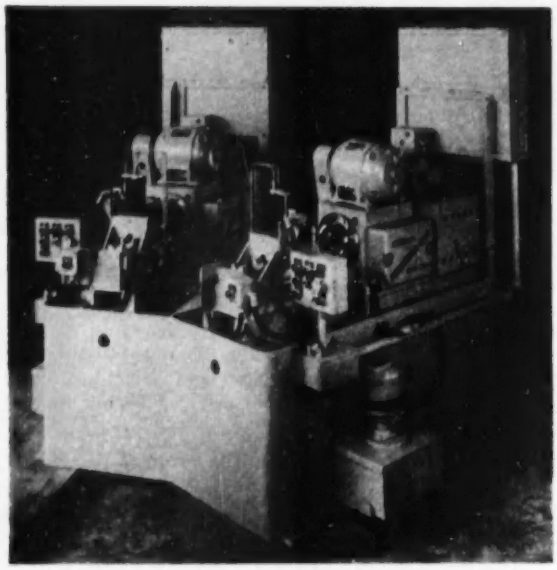
Circle 67 on page 73 for more data



Operator sees gear in relation to basic rack chart-gage.

NEW EQUIPMENT PLANT • PRODUCTION

For additional information, please use postage-free reply card on page 73



The Murchey threading machine.

Special Threads

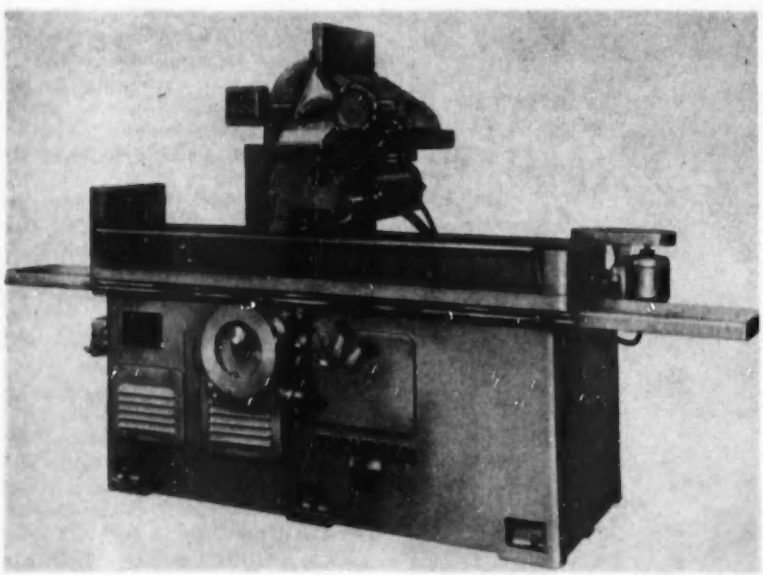
A special machine for threading a main transmission shaft with a ⅞-16 2A thread 11/32 in. long, at a rate of 400 parts per hour, is a recent development. It incorporates two Precision-Pak self-contained threading units, each having automatic cycling, precision lead screw, and fast spindle return. The units are mounted on a specially constructed double welded base complete with built-in coolant pumps. They are positioned on an approximate 45 deg angle so that both can be operated at one time. An air operated collet type fixture in line with each threading unit is used to hold the part during threading.

The operator picks up a part in each hand, inserts them in the collets and presses the starter button on each unit. As soon as the automatic threading cycle is complete, the part is automatically released for unloading. Each "Precision-Pak" has an internal threading capacity ranging from 1⅛ in. to four in. and an external capacity from ¾ to 3½ in. It will generate a maximum thread of eight pitch, spindle travel from ½ in. to four in., and spindle speeds from 38 to 346 rpm in increments of approximately 15 rpm. *Murchey Div., Sheffield Corp.*

Circle 69 on page 73 for more data

Grinder Line Introduced

Type B hydraulic surface grinders ranging in sixteen sizes from six in. by 18 in. to 12 in. by 120 in. were announced recently.

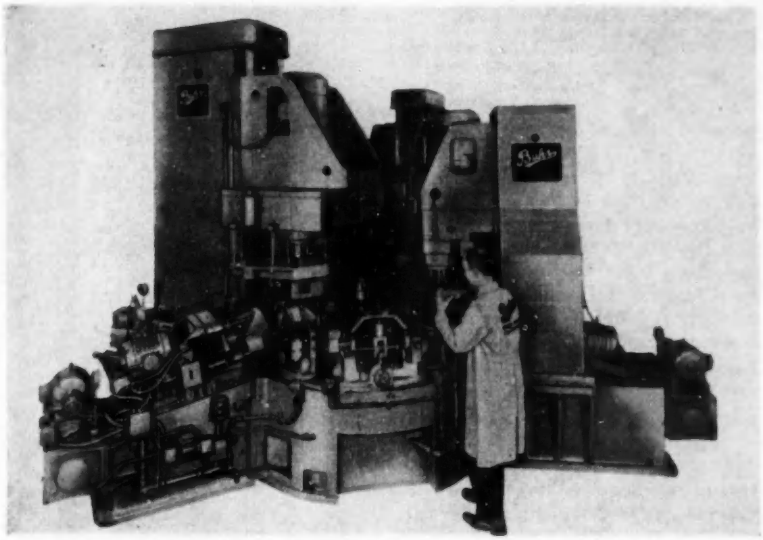


The Type B Thompson 12x24 grinder with automatic down feed.

Features include the following: Crossfeeding wheel head with horizontal spindle grinding with periphery of the wheel; patented anti-friction elevating nut; "in position" wheel truing; smalled increments of down feed and wider increments of crossfeed; flame hardened cross slide ways; integral motor drive to wheel spindle; low pressure hydraulic system; automatic lubrication; built-in coolant system; tape bed way covers; adjustable bronze spindle bearing; manual cross feed.

Available as auxiliary equipment are the following features: Automatic down feed; micrometer backup stop; coolant through the wheel; high speed spindle attachment; dust collector; auxiliary hand table feed; Hoglund Magniform contour dressers; coolant filter; power elevation; magnetic chucks; demagnatizing switches and mg. sets; magnetic coolant separators; rectifiers and neutrolators; wheel balancing ways and arbors; Delpark coolant filters. *Thompson Grinder Co.*

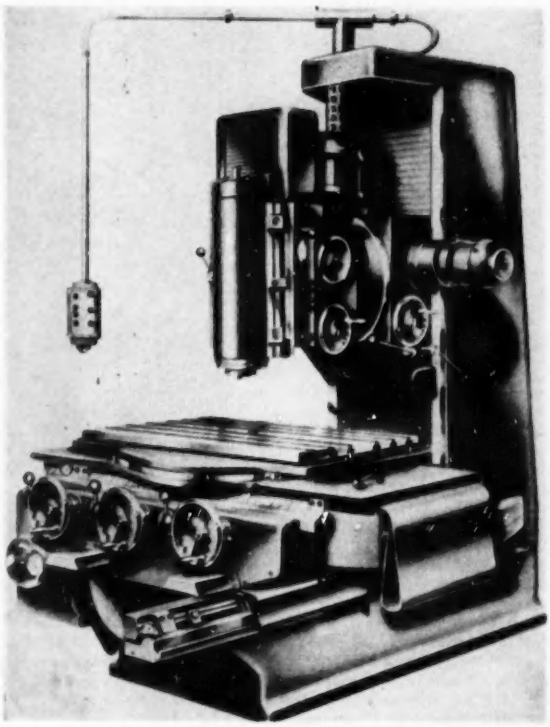
Circle 70 on page 73 for more data



Two Parts from Automatic Drill

Through the combined efforts of the customer and machine tool builder, this drilling machine is now processing two different models of flywheel housings simply by exchanging tools. It is a five-way automatic six-station fixture, arranged with hydraulic clamping and mounted on 60-in. diam. automatic index table. Forty-two operations are performed on each flywheel housing at the rate of 100 pieces per hour at 100 per cent efficiency—21 drilling, eight chamfering, two reaming, 10 tapping and one boring for each housing. It features tool-steel, laminated, hardened and ground ways, with ball-bearing construction for all spindles. Lubrication is automatic and electrical and hydraulic installation comply with JIC standards. (Buhr Machine Tool Co.)

Circle 71 on page 73 for more data



The Bokoe No. 3 boring mill handles work up to 8 ft in diameter, as well as castings on the floor.

Boring Mill Column Swivels

A swiveling column, which turns 180 deg horizontally in either direction similar to a radial drill, is combined with an unusually large work table and deep throat in the Bokoe No. 3 universal boring and milling machine for machining heavy cast iron and alloy steel workpieces to close tolerances.

The milling head on the column swivels vertically 90 deg in either direction. Table feeds are infinitely variable in longitudinal, transverse and rotary directions. Automatic controls on the work table provide for 28 in. transverse and 55 in. longitudinal movement with infinitely variable table feeds from 0.4 to 39 in. per min. Power feed for circular movement, infinitely variable from 0.7 to 70 in. per min., permits continuous circular milling operations. The table rotates 360 deg with power or hand feed. Scales and verniers for table movements and milling carriage are arranged for the use of gage blocks in the production of tools, dies and fixtures.

Large milling slide movements, with six mechanical feeds and rapid travel, allow drilling and boring operations up to 11⅞ in. and milling cutters up to 10 in. diameter. With a supplementary power-driven rotary side table, large patterns up to 31 ft in diameter can be milled. Depth of throat between column slide and spindle center is 37½ in.

A wide range of settings and adjustments are provided, with infinitely variable spindle speeds from 36 to 1800 rpm. The variable speed changer can be operated without stopping the machine. In addition to vertical milling and boring, the Bokoe can also be used as a radial drill. By turning the swivel column 180 deg, castings mounted on skids on the floor can be drilled.

All operating controls and levers are easily accessible. Column and vertical slide are fitted on the base which also holds the longitudinal slide, cross-slide and work table. A wide range of attachments and accessories extend the versatility of the machine. *Kurt Orban Co.*

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NEW EQUIPMENT — PLANT • PRODUCTION

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Dust Collector

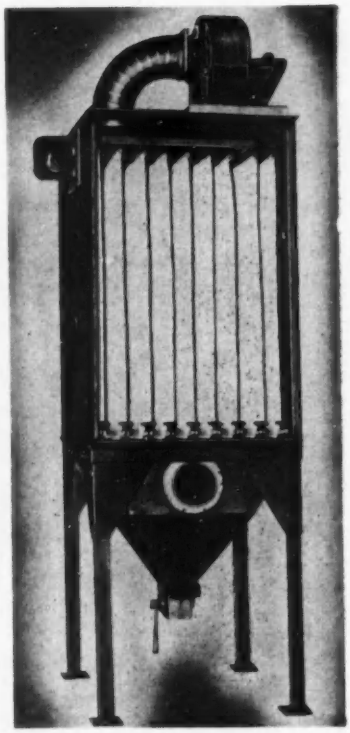
The unit-type CN cloth bag collector, designed for economical and efficient dust collection for smaller volume applications, is self contained and shipped assembled ready for installation.

This collector is designed for indoor use, and cleaned air can frequently be discharged inside the plant. Finely divided dusts such as carbon black, cork, fine wood, graphite, pigments, lime, lamp black, soap, fine tobacco and metal oxides, are collected through cloth filter bags similar to the large type CM dust collector.

Dust laden air enters the collector where it is expanded in a settling chamber. Here, the reduction in velocity drops coarser dust particles directly into the hopper. A baffle plate prevents the air from rising immediately to the cloth bags, and therefore the only escape for air is through the open bottom of the bags. This air then flows into the bags where the fine dust particles are filtered on the bags' inner surfaces. Cleaned air passes through the bags and is discharged from the collector.

Cloth bags are made of heavy weight, sateen weave, cotton filter fabric stitched vertically to form multiple tubes. Collector casings are constructed of heavy-gauge steel, with gasketed flanges bolted to substantial structural frames.

Seven sizes of the CN collector are available, ranging from 200 to 1000 sq ft of cloth area. Sizes 200 to 500, inclusive, have one hopper and nine bags. Width and depth are constant, additional capacity being supplied by lengthening the bag. Sizes 600, 800 and 1000 are double sections of the 300, 400 and 500 sizes, featuring two hoppers and 18 bags, but only one air inlet and one settling chamber. *Pangborn Corp.*



Pangborn's new unit type CN cloth bag dust collector. Cloth bags are supported on a shaking mechanism that produces an action in bags much like shaking a rug.

Circle 73 on page 73 for more data

Central Lube for Industrial Trucks

Industrial trucks equipped with centralized lubrication are now available, using Lincoln Engineering Co.'s Centro-Matic system.

Starving or over-lubrication of bearings is said to be prevented. The system permits application of grease to any number of points. An injector for each point is connected to the bearing by a tube and receives its supply of grease under pressure from the central pumping unit. Each injector measures out a prescribed amount of grease to the bearing each time pumping pressure is applied.

An adjustable knob permits varying the amount of grease sent to the bearing. The system works under a pressure of about 2500 psi. An indicator stem on each injector provides visible evidence that grease is being properly metered.

Lincoln Model 1273A or Model 1808 Bucket Pump can be adapted to operate the system by the use of an adapter nipple supplied with the truck. When desired, a manually-operated pump can be permanently attached to the truck to permit the truck operator to perform the lubrication job himself. *Elwell-Parker Electric Co.*

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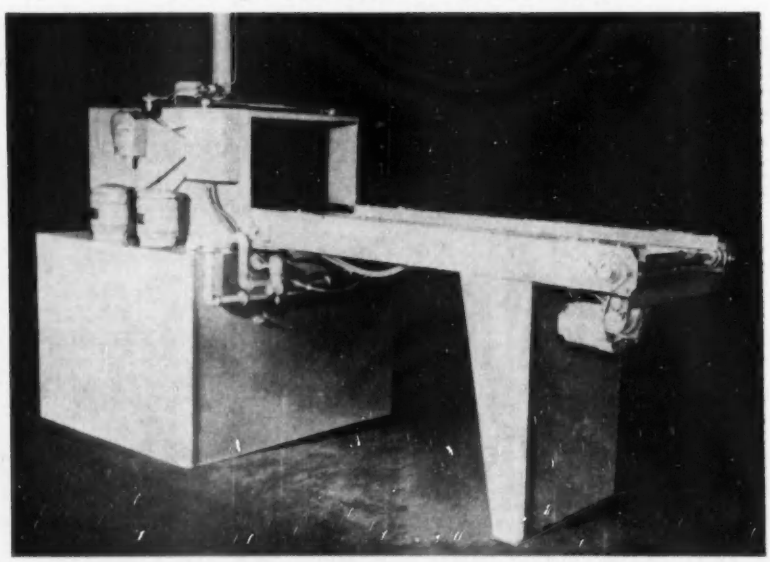
Brine Quench Unit Transfers Load



A self-contained brine quench unit features completely automatic transfer of work load from adjoining heat treating furnace through its own brine quench. It is for use with series T metal treating furnaces. A compact, welded steel unit, it is available in load capacities of 300, 400, and 700 lb. Solution temperatures, work handling and solution circulation are all controlled automatically by presettings on controls built into the regular furnace control panel. Temperature of the brine solution is controlled by immersion-type, finned cooling coils through which tap water passes. The loader section of the unit also serves as a roller-type unloading platform. (Ipsem Industries, Inc.)

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Two-Way Radio

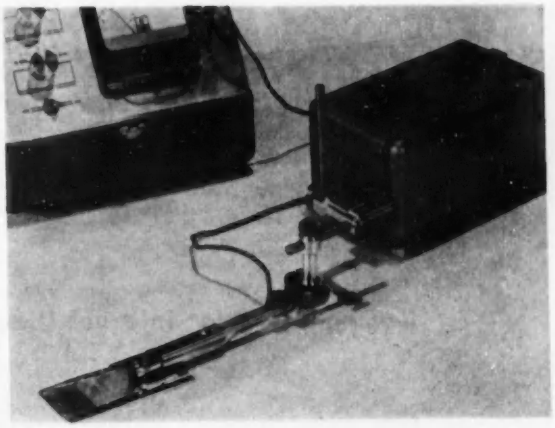
A radio transceiver, called the Portafone, carries Federal Communications Commission Class B radio telephone type approval, and operates in the citizens' radio band at a fixed frequency of 465 mega-

cycles. It may be operated as a portable radio station when used with a battery pack, or as a fixed central radio station by connecting it to a special power pack designed to plug into any 115 volt, 60 cycle, a-c electric outlet. Or, it may be operated in an automobile by plugging a special adapter into the cigaret lighter socket of the car's instrument panel. The Portafone requires an FCC station license, but not an operator's license. It is sold in pairs, each of which combines a transmitter and receiver in one instrument similar in appearance to a telephone handset. Weight of the instrument is 28 oz. (Stewart-Warner Corp.)

Circle 76 on page 73 for more data

Tracing Drive

A mechanical tracing accessory for use with the Surfindicator, an instrument which measures surface roughness, provides mechanical movement of the Surfindicator pickup along a surface being inspected. It is designed for special applications which extend the usefulness of the basic Surfindicator beyond the range that is practical with hand operation. It has a reciprocating stroke whose length is adjustable from 2⅞ in. to less than 1/16 in. Stroke speed is ⅛ in. per second. Instantaneous reversal, constant speed, and low vibration level of the unit insure surface roughness measurements of the highest possible accuracy. (Brush Electronics Co.)



Circle 78 on page 73 for more data

Small Parts Turning

A Swiss type high precision automatic lathe, to be known as the Howard D-500, is said to provide extreme accuracy, perfect concentricity and very high finish in the mass production of small, slender parts. Capacity is ½ in. Parts up to 12 in. long, having total turned lengths not over four inches, may be produced by using a stop attachment.

This machine maintains the best features of its predecessor, the Wickham No. 2 (formerly made by the same company), with heavier construction and many improvements. Attachments for drilling, chamfering, counterboring, tapping, threading, slotting and tapering are available. *Detroit Cam & Tool Co.*

Circle 79 on page 73 for more data

Die Nibs

A standard line of unground cemented carbide nail gripper die nibs is offered in four sizes ranging from ½ to ¾ in. designated NDB-8, 10, 11 and 12, stocked in grade 190 Carboloy cemented carbide. *Carboloy Dept., General Electric Co.*

Circle 80 on page 73 for more data

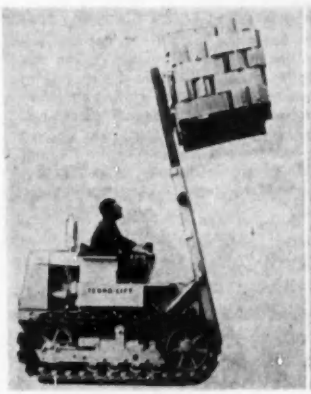
Hoist Line Added

A line of eight electric hoists, ¼ to two ton, features high-torque electric motors with 30-minute 55 C time rating; triple reduction gearing under continual lubrication; and dual braking, on load and motor, for precise spotting control and maximum safety.

A unique load braking system, declared exceptionally efficient and trouble-free, employs a non-reversing automatic spring clutch to actuate the Weston brake without pawls or ratchets. Either motor or load brake can hold the rated load indefinitely suspended, even when power failures occur. Of the eight new hoists, five have flexible wire-rope cable lift and pendent push button control, available in ¼ to two-ton sizes at 15 to 38 fpm lifting speeds. Three have welded alloy steel link chain lift and pendent rope control, in capacities ¼ to one ton, lifts up to 66 feet. *Chester Hoist Div., National Screw & Mfg. Co.*

Circle 77 on page 73 for more data

Two Tractors for Rough Work



Terra-Lift M3

This unique off-the-road multi-purpose fork lift can be converted within 10 minutes from a 3000-lb capacity fork lift into a ¾ yard bucket loader, six-ft angling dozer, or towing tractor of 30 drawbar hp. For indoor and outdoor use, the lift truck is equipped with hard rubber shoes and operates over oil-soaked floors, silicon sand, or steel scraps in mills, foundries, and manufacturing plants. (American Tractor Corp.)

Circle 81 on page 73 for more data

Yardloader

A low-cost gasoline engine 4000 lb fork truck is designed for outside or rough-surface work and, features a travel speed of 14 mph. Price is said to be about 25 per cent less than other gas-powered fork trucks of the same capacity. Large pneumatic tires and high ground clearance are additional features which suit the truck for yard handling operations. It uses an extra heavy drive axle and an oscillating trail axle. (Baker-Raulang Co.)

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NEW EQUIPMENT PLANT • PRODUCTION

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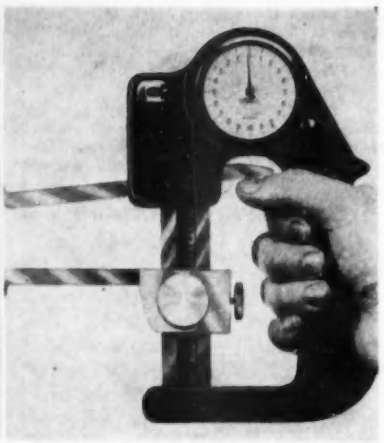
Comparators for Internal Diameters

"Interapid"

The gage above, with capacity for internal diameters from ⅜ in. to six in., is adjusted by turning the knob in the center of the gage. Initial setting is made with gage blocks, master gage rings or micrometers. A small locking lever on the instrument handle is provided for retracting the arms to make it easier for the gaging tips to enter the work being checked. The meter-type scale is graduated in 0.0005 in. Minimum counterbore depth is 1/16 in. The set includes two sizes of center arms which snap on and off readily for checking larger diameters. They provide a three point contact on one arm which eliminates hunting for the center of the bore. (Portage Double Quick Tool Co.)

Circle 83 on page 73 for more data



"Diametrick"

The dial indicator measuring instrument above has just been introduced for the improved checking of "O" ring and snap ring grooves. It is also applicable to other inside diameters. Embodying some features of a height gage, the standard model A will check holes from 1.375 in. to 3.625 in. in diameter and will expand to measure grooves as deep as ¼ in. Other sizes are available for smaller and larger bores. All bearings and adjustments are outside of work. In use the the gage is held with the lower gaging arm resting firmly in the work, permitting rocking of upper arm in all directions. It is said to be useful also as a caliper in the tool room and experimental department. (Mutual Engineering Service.)

Circle 84 on page 73 for more data

Coil Feeder

The Koil-Kradle, a device for automatically feeding all types of coiled stock to production machines, is introduced. It features an automatic trip bar which actuates a motor switch as the slack loop is tightened. The motor then feeds a new loop at the rate of 90 fpm (continuous operation), automatically shutting off when the correct loop size is reached. As a result, material is fed to the forming machine from a slack loop rather than from the full weight of the coil. Rate of feed to the forming machine is universal and is determined solely by the machine's individual requirements without attention of or adjustment by an operator.

To ease loading, the trip bar lifts up, completely exposing the throat of the machine. A ramp is provided by which heavy coils can be rolled into the cradle, eliminating lifting effort.

An adjustable guide plate partitions the roll area, establishing correct width for various roll sizes. Rolls may be rotated either direction for feeding or rewinding stock.

Three machine sizes are built at present for 10 in., 13 in., and 15 in. roll widths, 36 in. diameters. *Benchmaster Mfg. Co.*

Circle 85 on page 73 for more data

Automatic Brake for Fork Trucks

A fork truck automatic breaking feature is so designed that when the operator leaves his truck for any reason, the driver's seat rises instantly, causing the parking brake to be applied.

In addition, a time delay relay permits the engine to idle for three minutes before automatically shutting off. The device is an option on the maker's line of fork trucks. *Yale & Towne Mfg. Co.*

Circle 86 on page 73 for more data

Electric Truck for Hazards

A line of electric fork lift trucks was approved recently by Underwriters' Laboratories for use in hazardous locations involving fire or explosion. The firm is now prepared to take orders for 2000, 3000, or 4000-lb capacity models of HF Skylift electric trucks, which will carry Underwriters' Laboratories type EX label, signifying inspection and approval for hazardous operations.

The NFPA recommends use of type EX trucks in areas and locations covered in Class 1, group D, division 1, as set forth in its code book. *Automatic Transportation Co.*

Circle 87 on page 73 for more data

Dehumidifier

An adaptation of the Kathabar humidity conditioning equipment is designed especially for storage warehouses and war production plants placed in stand-by condition. The new units are a combination of refrigeration and chemical dehumidification, with an air-cooled compressor. The condensing coil is located in the leaving air stream, giving the system adiabatic operation.

The new units are compact and because of the adiabatic operation work entirely on electric energy. They are said to maintain 35 per cent relative humidity, even to as low as 20 F temperature. *Surface Combustion Corp.*

Circle 88 on page 73 for more data

Al Alloy

An aircraft structural aluminum alloy, HZM 100, having typical ultimate mechanical properties of 100,000 psi, has guaranteed mechanical properties above those of any aluminum extrusion alloy yet developed. This composition was chosen to develop the optimum mechanical property pattern in extruded sections together with the maximum resistance to corrosion. *Harvey Aluminum.*

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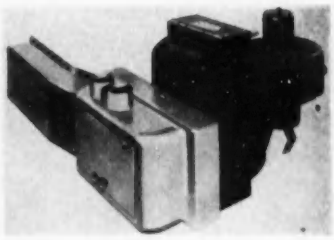
NEW PRODUCTS

FOR ADDITIONAL INFORMATION, please use postage-free reply card on PAGE 73

Passenger Car Heaters and Circulators

A line of passenger car heaters featuring large capacity cores and blower systems which also serve as fresh air circulators has just been introduced. Known as Conditionaire, the units are custom-built for Chevrolet (shown), Plymouth, Ford and Mercury. They have a heating capacity up to 24,000 BTU's per hour at 150 F temperature differential. Fresh air is circulated by a 4¼-in. fan. Heating, air-circulating and defrosting are regulated by two plastic knobs on a chrome panel. *HaDees Heater, Div. of Gabriel Co.*

Circle 26 on page 73 for more data



Air-Cooled Engine Line is Expanded

Expansion of a two-cycle, air cooled industrial engine line to include a new model in the higher horsepower range, and complete restyling of existing engines has been announced. The new engine is in the two to three hp range. Applications include power mowers, chain saws, pumps and dusters.

Restyling of existing models has enabled the firm to offer a lighter, more compact engine in the one to two hp range.

Basic models weigh 13 to 18 lb, have a low profile of only eight in., and are available with either vertical or horizontal drive. Models with 3.90 cu in. displacement provide power up to 1.6 hp at 4000 rpm, and 5.10 cu in. models range up to 2.8 hp at 4000 rpm.

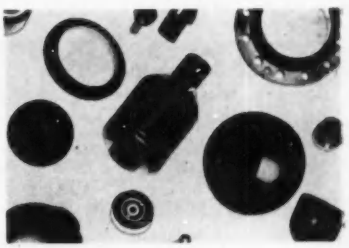
Additional information can be obtained from the *Industrial Engine Sales Div., West Bend Aluminum Co.*

Circle 27 on page 73 for more data

Molded Rubber Parts from West Coast

Custom molded silicone rubber parts for automotive, aircraft, electrical equipment and other industries are now available. The manufacturer states that parts with excellent service under adverse operating conditions are being produced to commercial and government specifications by transfer, injection, and compression molding. Its complete service includes compound formulation, mold-making facilities and full acceptance of responsibility from blueprint to finished part. The firm bonds rubber-to-metal to tolerances as close at five microfinish using the new Permadizing process. *Stillman Rubber Co.*

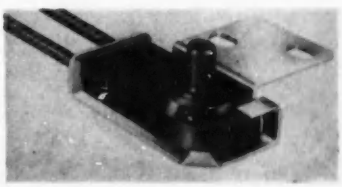
Circle 28 on page 73 for more data



Molded Plunger Switch is Simplified

In a waterproof switch designated Part No. 201209 by the manufacturer, working parts are completely waterproofed. There is no external mechanism. The small rubber plunger can be fabricated in accordance with customer's specifications. Overtravel is an inherent characteristic. The bracket is of one-piece construction. The stainless mounting has no corners. *Control Products, Inc.*

Circle 29 on page 73 for more data

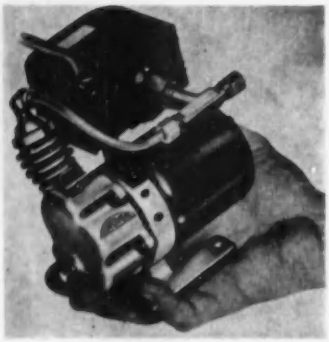


NEW PRODUCTS

For additional information, please use postage-free reply card on page 73

Midget Compressor

This air compressor weighs 5¾ lb including motor, and is designed to provide a continuous source of air pri-



marily for the operation of air horns on trucks and passenger cars. It is 6⅝ in. high, five in. wide, and 6½ in. long, and is available for six or 12-volt electrical systems. It delivers air to an air supply tank where a constant pressure of from 90 to 120 lb is maintained. The mounting bracket is designed for either side or bottom mounting on splash pans or any convenient spot under the hood. It will be sold and serviced by distributors throughout the United States. *Grover Products Co.*

Circle 30 on page 73 for more data

Buna N

Compound 1225, a new development of Buna N, having outstanding properties as to heat resistance (300-325F), good oil resistance properties and very low compression set at elevated temperatures, is available. It is also flexible as low as —40F. Other high physical properties include tensile strength of 2500 psi, elongation of 350 per cent, and durometer of 70 points. *Goshen Rubber Co.*

Circle 31 on page 73 for more data

Thin Bronze Strip

Phosphor bronze strip, precision-rolled to very close tolerances and to thin gauges and foils, is now readily available. Phosphor bronze is rolled by this company in strip up to 6 in. wide and down to 0.0005 in., to tolerances as close as ±.0001 in. The strip is available in any quantity from one lb to thousands of pounds. *American Silver Co.*

Circle 32 on page 73 for more data

Liquid Valves

Manifold valves for highway transport equipment named the Warren Square Manifolds, are available in two, three and four in. sizes. The square design provides weight savings of up to 18 per cent in the four in. sizes and manifold hanger heads are up to 53 per cent lighter on four in. valve manifolds. Further weight reductions have been made on connections to the manifold. *Betts Machine Co.*

Circle 33 on page 73 for more data

Battery Control

The Acutrol battery control now on the market is a mechanical regulator rather than the voltage type regulator. The unit registers internal gas pressure in the battery and relays the charging rate to the generator, including the necessary adjustments based on outside temperature. *Franklin Products, Inc.*

Circle 34 on page 73 for more data

Pre-Heater

A pulse-jet pre-heater for internal combustion engines, Diesel or gasoline, is now being marketed in this country. Manufactured in Germany, pending completion of domestic production arrangements, the device is a peacetime application of the principle utilized to propel the German V-1 buzz bomb. Known as "Swingheater," the apparatus yields 20,000 Btu's per hour from 1⅓ pints of gasoline, with an efficiency of 92 per cent. It has only one moving part, replaceable plastic flutter-valve. *Devenco, Inc.*

Circle 35 on page 73 for more data

Plug Indicator

A spark plug indicator with a deep well spark view chamber shows the car owner as well as the mechanic how the spark plugs are firing.

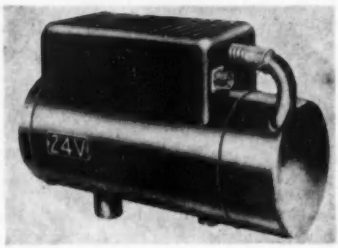
The improved indicator shows relative operating efficiency of old plugs compared with new ones, and acts as a positive check for replacing or servicing spark plugs. A flip-flop connector arm and an easy-to-read indicator dial speeds the checking process.

The indicator can be used in conjunction with present spark plug cleaners. *AC Spark Plug Div., General Motors Corp.*

Circle 36 on page 73 for more data

Coolant Heater

A combustion-type engine coolant heater was introduced to members of the Society of Automotive Engineers at their annual convention this week. Model 939-A is six in. in diameter and 15¼ in. long, and delivers 15,000



BTU/hr to the engine coolant. Six thousand BTU/hr from the heater exhaust is available for other uses.

It is similar in many respects to the firm's line of hot air heaters for the military services, and many service parts are interchangeable with those of other heaters currently manufactured.

This new heater may be mounted either horizontally or vertically, and it will operate satisfactorily on a moving vehicle. As an engine pre-heater, or for standby engine heating, it offers the advantage of maintaining a constant coolant temperature by cycling automatically between high and low heat. In most cases, no coolant circulating pump is required; where the heater can be mounted ideally, circulation of coolant is achieved by thermo-syphon action. *Stewart-Warner Corp., Southwind Div.*

Circle 37 on page 73 for more data

Power Brake Kits

Passenger car power brake kits for Cadillac, Ford and Chevrolet, now available, feature hydraulic lines pre-flared. Fittings are factory installed on the power unit. The kits contain the "Installograph," a copyrighted installation procedure. *Bendix Products Div., Bendix Aviation Corp.*

Circle 38 on page 73 for more data

Free INFORMATION SERVICE

Postage-Free Postcards Are Provided Here for Your Convenience to Obtain FREE LITERATURE and Additional Information on NEW PRODUCTION AND PLANT EQUIPMENT, AND NEW PRODUCTS Described in This Issue of AUTOMOTIVE INDUSTRIES. Please Circle Code Numbers of Items in Which You Are Interested, Print Name, etc., and Mail Promptly for Quicker Service.

USE THIS POSTCARD

FREE LITERATURE

Stainless Grips 1

To facilitate greater speed in ordering stainless steel fastenings, a 20-page catalog is available itemizing a large, varied inventory. It includes cap screws, nuts, washers, machine screws, sheet metal screws, wood screws, set screws, etc., and pipe fittings. A special page in the front of the catalog is devoted to suggested short cuts in ordering that help keep costs down. *Star Stainless Screw Co.*

Latches 2

A design portfolio containing full scale drawings and data sheets on heavy duty structural latches is now being offered to aeronautical and industrial engineers. *Simmonds Aerocessories, Inc.*

Motorcylinder 3

This is an adaptation of a gearmotor, utilizing a high-torque, high-slip electric motor and a crank to transform rotary to reciprocating motion. Included in the integral-type units are cams, limit switches, and motor brake that can be set and coordinated to stop the crankpin at around-the-clock positions. Booklet B-6090 describes how they can be employed to flip, turn, release, raise, or lower material in repetitive cycles. *Westinghouse Electric Corp.*

Coated Fabrics 4

With the formation of a Mechanical Products Div., H-M announces a catalog of its rubber and synthetic-coated fabrics, as well as fabric molded diaphragms. *Haarts-Mason, Inc.*

Business Trends 5

The two-yd long chart of American business trends since 1790 again is offered. *Ex-Cell-O Corp.*

Face Grinders 6

Radial head face grinders with automatic cycling are described in catalog 700-2-52. Simplified diagrams explain eight methods of tooling and operating the grinders. *Besly-Wells Corp.*

Tumbling Barrels 7

A 12-page catalog shows a line of horizontal and tilting-type tumbling barrels, with such features as agitator strips and working shifting bottoms. *Hupp Corp.*

2½-in. Automatic 8

Model AW 2½-in. single spindle automatic screw machine is described in a bulletin just announced. *Cleveland Automatic Machine Co.*

(Please turn page)

VOID After Mar. 15, 1954 1/15/54

Circle code numbers below for Free Literature, New Plant Equipment, or New Product Information

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
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Business Service Dept.

Silastic 675 — 9

This silicone stock for gaskets, O-rings, and molded goods features low long-term shrinkage, high tear resistance, and extreme temperature range. *Dow Corning Corp.*

Crane — 10

A mobile crane with telescoping boom can be self-propelled or truck-mounted. Reach is 24 ft. Capacity is 3200 lb at 18 ft and 8000 lb at 10 ft. *Austin-Western Co., Div. of Baldwin-Lima-Hamilton Corp.*

Testing — 11

Bulletin 32 just issued pictures unusual non-destructive testing instruments applicable to the automotive, aircraft and metal working industries. *J. W. Dies Co.*

Adhesives — 12

A 12-page, illustrated booklet to assist aircraft manufacturers in solving tough design and production problems by the proper application of adhesives, coatings and sealers is being made available. *Adhesives and Coatings Div., Minnesota Mining and Manufacturing Co.*

Clutches — 13

A bi-monthly bulletin of case histories, technical features, and news in the field of industrial clutches is now available from the *Formsprag Co.*

USE THIS POSTCARD

Truck Catalog — 14

A revised condensed catalog covering electric-driven industrial trucks was announced recently. It includes data on the Dynamotive, the gas fork lift truck with electric transmission. *Automatic Transportation Co.*

Insert Standards — 15

New military standard sheets have been issued covering helical coil wire thread inserts (National Coarse and National Fine series) for aircraft applications. Separate sheets list nominal lengths of 1, 1½, 2, 2½ and 3 diameters. Maximum and minimum tolerances are established for all characteristics of the inserts. Thread diameters range from .164-32 to 1.000-8. Copies are available from *Heli-Coil Corp.*

Electrostatic Spray — 16

A 16-page brochure on the No. 2 Electro-Spray process is available. It describes how the process works, and proves paint and labor savings by case-history presentation of 27 production painting jobs on a wide variety of sizes and shapes of parts and products. *Ransburg Electro Coating Corp.*

Boring Mills — 17

Catalog K-1, fully illustrated, contains complete description and specifications on King vertical boring and turning machines, sizes 30 in., 36 in., 42 in. *American Steel Foundries, King Machine Tool Div.*

Engine Accessories — 18

A 24-page booklet describes development, testing and production of aircraft engine accessories, for fuel, hot air and hydraulic systems. Another portion of the booklet features research and development facilities of the company's Engine Accessories Div. Included is material on a variable area fuel nozzle and data on fittings, valves and filters, anti-icing accessories and de-icing valves and their performance, hydraulic accumulators, check valves, relief valves, servo valves, fuses, actuators and filters. Bulletin 1330-B-1. *Parker Appliance Co.*

3-D Contouring — 19

Facilities for the production of contoured airframe sections and dies and molds for fiberglass and metal products are illustrated in an eight-page brochure published by *MPM, Inc.*

Training Material — 20

Officials charged with apprentice training in industry will appreciate a color folder describing instructor-student aids, including color sound films and slides. *South Bend Lathe.*

Alumibonding — 21

The story of the many successful applications, including bearings, of Alumibonding is described in an eight-page fully illustrated booklet. This patented process of molecular bonding of aluminum and its alloys to iron, steel and their alloys is being used extensively for weight reduction, greater free machinability, corrosion resistance, and better thermal conductivity. *Arthur Tickle Engineering Works.*

(*See preceding page*)

VOID After Mar. 15, 1954

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...to cut your production costs

Hy-Pro centers its operation on solving tap problems . . . problems which can cost you time and dollars. Because taps are Hy-Pro's important line, they continually concentrate their research and creative staff at analyzing and improving every phase of tap use. The result has been their proven reputation in production circles as the "Tap Specialists."

Whatever your tap needs may be, either specials or standards, it will pay to contact Hy-Pro. Call direct or see your nearest distributor. Their engineer specialists can help you cut production costs.

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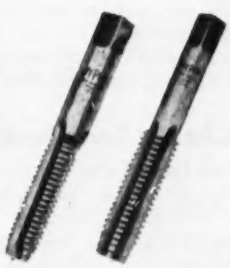

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10428 W. McNichols Rd.
DETROIT 21, MICH.
University 4-1077

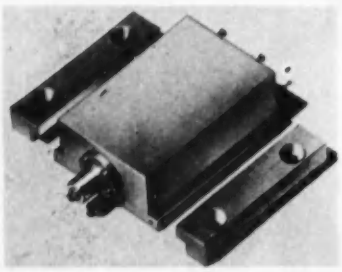
6141 North Elston Ave.
CHICAGO, ILL.
Newcastle 1-6486

NEW AIRCRAFT PRODUCTS

FOR ADDITIONAL INFORMATION, please use postage-free reply card on PAGE 73

Instruments

A line of scientific instruments for ground and flight investigations recently introduced includes linear and



angular accelerometers; displacement, pressure, and differential pressure transducers; strain gages and vibration analyzers.

The instruments are made in two types: Inductive, for use in a-c circuits, and floating strain wire type, for use in either a-c or d-c circuits.

A unique suspension system is said to reduce hystersis to a value hithertofore unobtainable. The maker claims inter-axis coupling has been eliminated and elastic deformation has been reduced to a negligible value.

The instruments have an accuracy of one per cent of full scale or better throughout a temperature range from —65 to 200 F, and a resolution of 0.05 per cent of full scale or better. Ranges are from 0.002g to 5000g for linear accelerometers; 0.1 rad/sec.^{2} to 3000 rad/sec.^{2} for angular accelerometers, and 0.003 in/in. for strain gages. *General Scientific Corp.*

Circle 46 on page 73 for more data

Checks Temperature

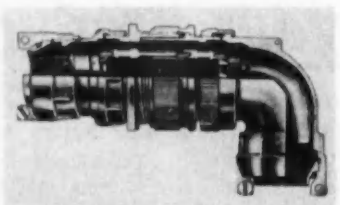
A full line of aircraft temperature measuring system components has been developed, including thermocouples, leads, lead wires and harnesses; fire wall connectors, lead resistors and terminals; rotary selector switches in sizes from two to 18 positions; single or dual type indicators for measurement of cylinder head, tailpipe and bearing temperatures; and pyrometer relays that incorporate both a temperature indicator and an adjustable alarm relay for jet tailpipe measurements. All equipment is available to meet AN, MIL and commercial specifications. *The Winslow Co.*

Circle 47 on page 73 for more data

Connector

The type E—environment resisting —electrical connector is said to meet high altitude performance requirements. It was designed to protect sensitive electronic circuits from thermal shock, surface condensation and extreme vibration.

Convenience of assembly is a feature of this connector. The space between insert and grommet provides an ample working area for all as-

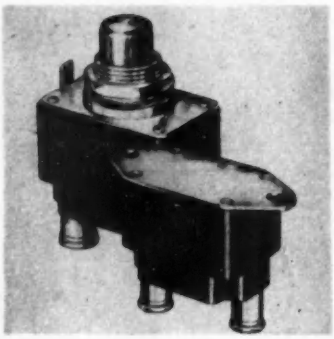


sembly and soldering operations. The connector is completely serviceable since individual wires can be removed or repaired with the connector in place. Moistureproofing is accomplished without the use of potting compounds. The manufacturer says it is the first of this type to be approved under the military specification MIL-C-5015A (ASG). *Scintilla Magneto Div., Bendix Aviation Corp.*

Circle 48 on page 73 for more data

Circuit Breaker

Models D6755-1 and D6756-1 Klixon circuit breakers in ratings of ½, ¾, and one amp are completely sealed and were especially designed for the protection of the power supply in aircraft instrument circuits. The D6755-1 is the manual reset, non-indicating type and the D6756-1 is the automatic reset version. Two of the D6755-1 will fit in the same mounting space required by one AN type push-pull circuit breaker. The D6756-1 with its

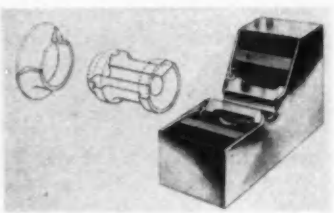


end mounting requires a slightly larger space. *Spencer Thermostat Div., Metals and Controls Corp.*

Circle 49 on page 73 for more data

Honeycomb Spacer

A specialty fastener, the Kwiko sandwich structure spacer, for use in fastening objects to honeycomb material, is quickly and easily installed in the sandwich structure without any



special tools. It can be manufactured in a variety of sizes and materials to meet specific requirements. Light in weight, yet claimed to be rugged enough to carry the load and prevent collapse of the sandwich structure, the spacer is for use in attaching instruments, seats, shelves, electrical equipment and other objects to honeycomb structures. It is designed in two series: the SL20, for use with ordinary AN bolts, and the SL21, for use with 100-deg countersunk head bolts. *Shur-Lok Corp.*

Circle 50 on page 73 for more data

Need small bearings that can carry heavy loads?

here's how manufacturers of materials handling equipment get them with NEEDLE BEARINGS

Leading manufacturers of lift trucks, industrial trolleys and conveyors, cranes, hoists and other types of materials handling equipment specify Torrington Needle Bearings because of their high capacity and their compactness.

They have been *performance-proved* through years of continuous, rugged service on many types of equipment, working indoors and out.

In lift trucks, for example, the high rated radial load capacity of Needle Bearings in steering knuckles, steering idler arms, transmissions and hydraulic lift cylinder crossheads has made possible increased load ratings without increase in power requirements. And their compactness permits the use of maximum material in surrounding members for added strength.

Torrington Needle Bearings have become "standard equipment" throughout industry since their introduction nearly twenty years ago.

Our Engineering Department will be glad to help you determine where the Needle Bearing can benefit your products.

THE TORRINGTON COMPANY
Torrington, Conn. • South Bend 21, Ind.

TORRINGTON *NEEDLE* **BEARINGS**

Needle • Spherical Roller • Tapered Roller • Cylindrical Roller • Ball • Needle Rollers

Trade-marks of leading materials handling equipment manufacturers who use Needle Bearings in their products.

The BUSINESS PULSE

Total Value of Goods and Services Reached All-Time High During 1953. Over-All Business Activity Down About Five Per Cent at End of Year Compared to Peak. Upturn in Construction Exception to General Trend

This Survey Is Prepared Exclusively for AUTOMOTIVE INDUSTRIES by the Guaranty Trust Company of New York.

Downward Trend

General business activity, from all appearances, was continuing to drift lower on a seasonally adjusted basis as 1953 drew to an end. At least the trend was downward at the beginning of the last phase of the Christmas rush period, and such information as is available at this writing on holiday trade itself does not suggest any break in pattern.

The year 1953 as a whole was a prosperous one for most branches of trade and industry, despite the year-end sluggishness in some sectors. The total value of goods and services reached an all-time high of approximately $368 billion, five to six per cent greater than in 1952. And since prices were generally stable throughout the year, it seems reasonable to assume that the better part of the year-to-year gain was in real terms, although it is too early yet to hazard a specific estimate.

Actually, however, comparison of output totals conceals, rather than illuminates, the really important differences between 1953 and 1952. What is significant for analytical purposes is that in the earlier year the trend of economic activity was persistently upward, except for the midyear setback caused by the steel strike, whereas in 1953 business registered gains in the early months but showed well-defined tendencies to recede in the latter months.

The quesion of the moment, of course, is how far the decline will go. The simple truth is that nobody knows, or can know, and, given the present state of knowledge, about the most that can be expected in the final analysis is intelligent guessing. This is so not only because the question relates to the uncertain future but also because there is no real agreement among economists, even at this late date, on the basic causes that are operative in cyclical business movements. In the light of some recent predictions of a very specific nature, these facts apparently can stand some repeating.

Adjustments Continue

The first step in trying to guess ahead is to assemble as much information as we can about the present situation. What is the trend of events at this time?

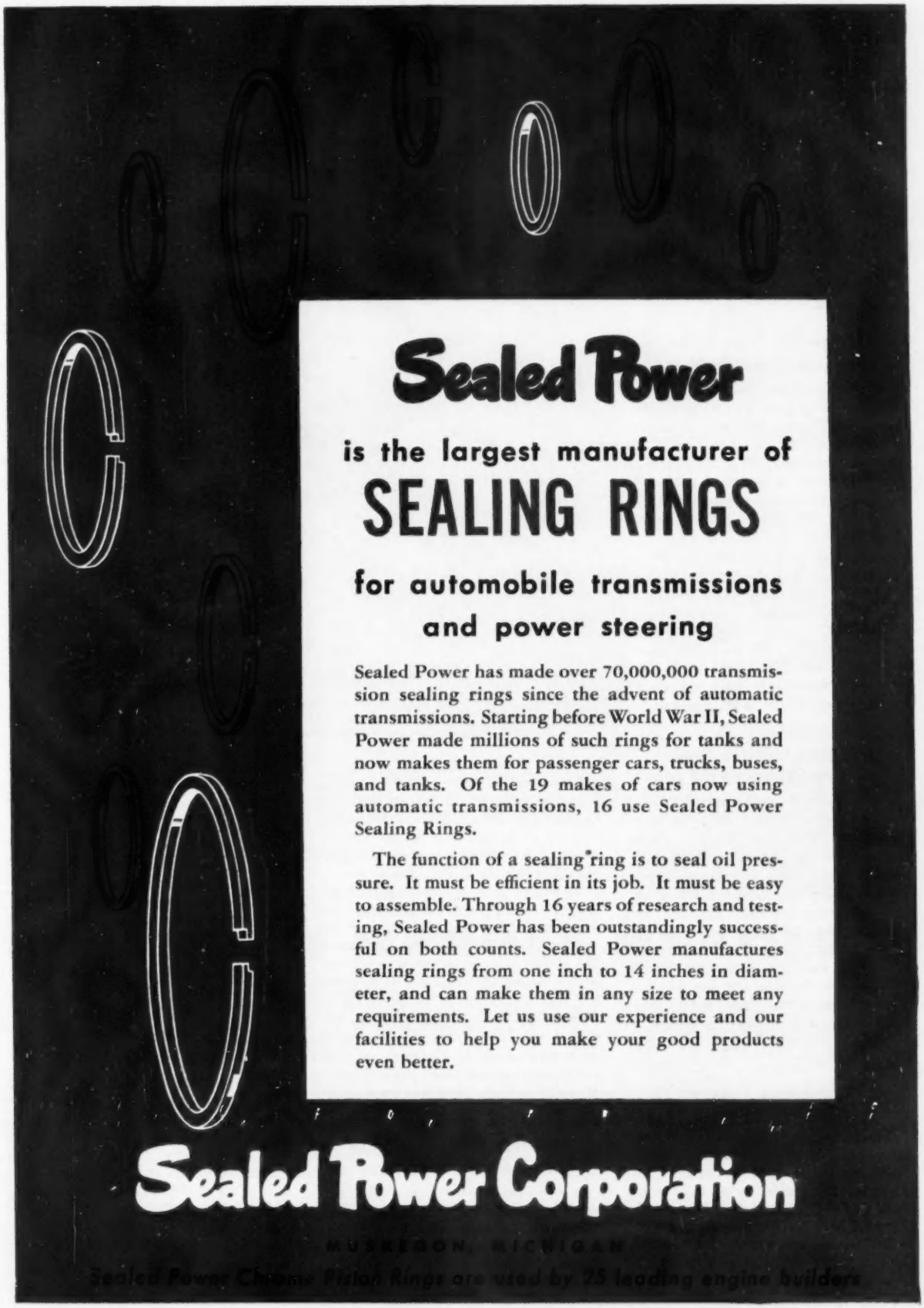
For one thing, it is quite obvious that adjustments are still in progress in a number of the major industries.

In the case of steel, weekly production rates declined almost without interruption during November and early December and then plunged sharply lower to less than 70 per cent of capacity in the holiday period, a development which contrasts sharply with the above-capacity operations of the steel industry in the holiday period of 1952. While some drop had been expected this year, it is probably safe to say that most outside observers were surprised by the sharpness of the decline. Shutdowns for repairs were responsible in part, but the fact remains that such shutdowns would apparently not have been as extensive as they were had it not been for slackened demand. New orders for January-February are known to have come in at disappointingly low levels, and thus in some degree the holiday cutbacks probably represent an attempt to average-out production rates. While there seems to be general optimism that experience will improve towards the latter part of the first quarter, the fact remains that at present the process of adjustment is clearly not at an end.

Adjustment to changed demand conditions still appears to be under way in the automobile industry as well. Reduced output rates in November, with respect to both the preceding month and November of 1952, helped effect some reduction in dealer new-car inventories, but even so such inventories remained at the uncomfortably high level of approximately 500,000 units as of December 1. Because of this situation, previous plans to step up production in December were modified, so that it now appears that output for the final month of the year did not run appreciably higher than in the preceding month. The inventory problem, in other words, is still with the automobile industry, and from all appearances it is destined to linger on for some time.

Similarly, the petroleum situation continues to reflect over-large inventories, which remain particularly worrisome in the case of gasoline. Crude oil output

(*Turn to page* 104, *please*)


Sealed Power
is the largest manufacturer of
SEALING RINGS
for automobile transmissions
and power steering
Sealed Power has made over 70,000,000 transmission sealing rings since the advent of automatic transmissions. Starting before World War II, Sealed Power made millions of such rings for tanks and now makes them for passenger cars, trucks, buses, and tanks. Of the 19 makes of cars now using automatic transmissions, 16 use Sealed Power Sealing Rings.
The function of a sealing ring is to seal oil pressure. It must be efficient in its job. It must be easy to assemble. Through 16 years of research and testing, Sealed Power has been outstandingly successful on both counts. Sealed Power manufactures sealing rings from one inch to 14 inches in diameter, and can make them in any size to meet any requirements. Let us use our experience and our facilities to help you make your good products even better.
Sealed Power Corporation
MUSKEGON, MICHIGAN
Sealed Power Chrome Piston Rings are used by 25 leading engine builders

News of the AUTOMOTIVE AND AVIATION INDUSTRIES

Continued from Page 24

Bridgeport Brass to Use Air Force Plant in Mich.

Bridgeport Brass Co. will take over the Air Force aluminum extrusion and forging plant located in Adrian, Mich., which has had a series of occupants since the end of World War II. The plant is equipped with several large extrusion presses, some of which were brought into this country from Germany.

Bridgeport will produce aluminum extrusions, tubes, and forgings for military planes, as well as commercial products such as aluminum extrusion rod, wire and tube. The company entered the aluminum mill products field more than two years ago and will concentrate that branch of its operation at the Adrian plant.

Rubber Industry Sees Good Year in 1954

The rubber industry is looking for another year of high level activity in 1954 but somewhat below 1953. Some reduction in original equipment tire business is forecast because of lower vehicle production expected this year.

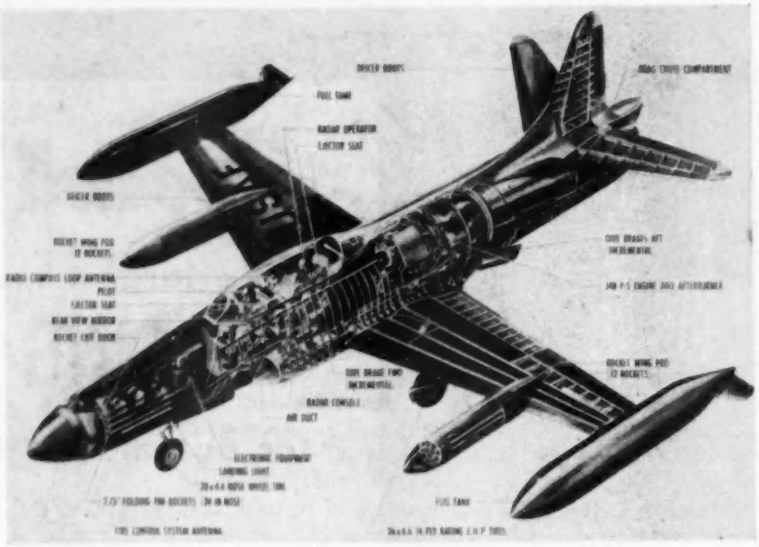
Replacement tire sales are expected to be higher this year than in 1953 because of the large volume of one, two, and three-year-old cars which will be coming into the market for replacement tires. Both prices and supply of new rubber are expected to be stable in 1954.

Perkins May Produce Engines in India

The managing director of F. Perkins, Ltd., British engine manufacturer, has been visiting India to investigate the possibility of producing their line of Diesels there. The firm's distributor in Madras, Simpson & Co., is at present assembling P6 engines with an output program based on 3000 units a year.

Perkins hopes that a supply of suitable metallurgical and machining facilities will be found in India to permit the eventual local manufacture of all components for its Diesels. Some 20,000 Perkins engines are currently in use in that country.

Another British company, David Brown, recently shipped its first consignment of knocked-down tractors to India for assembly at Bombay under the supervision of technicians trained at its Yorkshire factory. It is planned that the complete range of David Brown wheeled and track-laying machines will ultimately be assembled on a large scale in Calcutta, as well as Bombay, and that local production of parts will be progressively introduced.



STARFIRE SKELETON

In this first cutaway drawing of the Lockheed F-94C Starfire are revealed some of the vital organs which constitute a jet interceptor. The plane is armed with four dozen 2.75-in. rockets and carries more than 1200 lb of electronic equipment.

American Bantam to Make Snow Plow for Military

A new-style blower-type snow plow may be manufactured soon by the bankrupt American Bantam Car Co. The Armed Forces reportedly have invested $100,000 in the project. The plow would be used in removing snow from air bases.

American Brake Shoe Buys Business of Leader Welding

American Brake Shoe Co. has purchased the welding machinery business of Leader Welding and Manufacturing Co., Berkeley, Calif. The complete Leader line of automatic welding equipment will be sold by the Welding Products Dept. of American Manganese Steel Div. of American Brake Shoe and will be made available to Amsco distributors.

Schweitzer to Make Parts for Republic

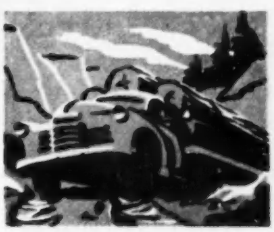
A million-dollar contract for jet plane parts has been received by Schweitzer Aircraft Corp. Republic Aviation Corp. has placed an order with the Elmira, N. Y., firm for a major section of the fuselage for the F-84 Thunderstreak.

Tooling for the new work is now under way, and production is scheduled to start about mid-February. Work on the order will extend over the next two years.

(*Turn to page* 166, *please*)

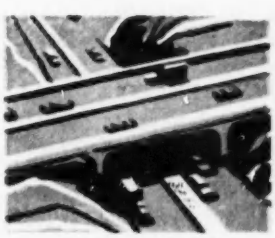
For tractors and implements . . .

for cars, trucks and busses . . .



NEW HYATT BARREL BEARING!

You're looking at a cross section of industry's newest find—*the bearing that's built with barrel-shaped rollers!* Developed by Hyatt, the Barrel Bearing is of true dual-purpose design—it takes load from any direction. But more than that, the Barrel Bearing is self-aligning—and misalignment of supporting parts cannot cause excessive wear, as it does with ordinary bearings. Now in volume production, this new bearing is in the newest trucks and busses, in farm, textile and construction equipment, and in many types of oil field machinery. In fact, if you own a new car there's a good chance that Barrel Bearings are in the wheels and differential.



for construction equipment and many types of new machinery.

HYATT

STRAIGHT BARREL TAPER

ROLLER BEARINGS

HYATT BEARINGS DIVISION • GENERAL MOTORS CORPORATION • HARRISON, N. J.

AIR BRIEFS

By ROBERT McLARREN

Expansion Checked

As the aircraft manufacturing industry moves into this new year there are positive signs that the accelerated expansion touched off by the Korean war has been checked. Some observers even predict reductions in employment during the year. Total employment on Jan. 1 stood at about 775,000 workers but some experts predict a drop during the year to as low as 725,000. Production volume is scheduled to continue at roughly 1000 airplanes a month for the military services at least through the middle of the year but the rate may drop to as low as 750 by year's end. Dollar volumes—at about $750 million a month—should continue through the year, however, reflecting the rising cost of more advanced types as they are introduced.

Production Record

New post-World War II production records were hung up during the past year with about 12,000 military aircraft being delivered—half of them jets. Late in the year the number of jet aircraft produced surpassed deliveries of piston-engined aircraft for the first time. More than 100 four-engined airline transports were delivered during the year plus well over 200 twin-engine executive aircraft. Single-engine utility aircraft production totaled about 3800 planes. This production aggregated some $9 billion during the year, indicating the substantial size of the industry in the national economy.

Airline Use Up

More than 30 million people used the domestic airlines during 1953, each of them flying an average distance of 565 miles. The airlines used 1420 airplanes (813 twin-engine and 587 four-engine—plus 20 single-engine types) to carry these passengers. The airlines carried an average express and freight load of 800 lb during each flight-mile covered. And for those who are interested in incidental statistics, civil aircraft in the U. S. made either a landing or a takeoff 17 million times during the year, or more than two every second of the year.

Air Power Future

Despite above-mentioned leveling-off of aircraft production, all signs in Washington point to an enthusiastic reception of the Air Force budget by the Congress for the 1955 fiscal year. It was the Air Force that "took the cut" last year and both Pentagon and Congressional leaders are determined that the Army and Navy will have to take it this year. Currently, the Air Force production program is scheduled on the basis of 120 combat wings by July, 1955. The new budget will contain money for an increase to 127 wings in 1956 and to 137 wings in 1957. Not only will the Air Force size steadily increase but the accent will be on defense—more Air Defense Command fighters and missiles and less troop transports and strategic bombers.

Rate Cuts

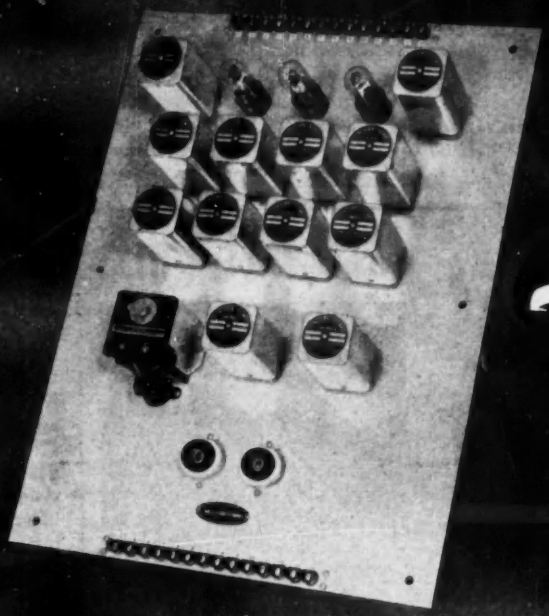
The Civil Aeronautics Board has granted the request of National Airlines and Northwest Airlines to have their mail pay rate reduced from 53¢ to 45¢ per ton-mile in order to place them in the same rate category as American, United, TWA and Eastern and thus enable them to carry first-class mail by air. At the higher rates of the two lines, the Post Office Dept. was excluding these two lines from first-class mail carriage. Other 53¢ carriers that will be reduced to the 45¢ rate in the next few weeks are Capital, Delta-C&S, Braniff and Western, although the reduction will require a compensating increase in other routes of these carriers to bring their average to 53¢. This action, spurred by the "lowest cost carriers get the mail" policy of the Post Office, almost completely shatters the five-year action of the Board in evolving the present complex mail pay structure and it is probable that a whole new series of hearings and rate determinations will ensue.

Making History

"United States Air Power is superior to that of any other nation." This statement by Admiral Arthur W. Radford, Chairman, Joint Chiefs of Staff, is the first time since World War II that a responsible Government official has even hinted at our absolute superiority over the Russians and, as such, is a landmark in the history of recent military publicity policy. Heretofore, we have been nurtured on a militant, obedient and endless series of warnings by military men that we were far behind the Russians in Air Power. Radford even goes further into the future and says:

(*Turn to page* 110, *please*)

From A SIMPLE SWITCH



To AN AUTOMATIC BRAIN

SYNCHRO-START CONTROLS
FIT EVERY ENGINE REQUIREMENT

The control panel pictured above is that used for FIRE PROTECTION at many large manufacturing plants — air fields — hospitals — theatres — department stores — office buildings and which is accepted by Insurance Companies as wholly dependable protection.

Engines controlled by SYNCHRO-START have opened many new fields providing huge savings for the users of engine power as the main source, or as stand-by in case of emergency.

For the past eighteen years, SYNCHRO-START CONTROLS have been constantly rendering dependable service and protecting lives and property all over the world — on the seas, in the air, on land and in the mines.

The duty and functions of SYNCHRO-START CONTROLS are:

1. To automatically START an engine at a predetermined TIME or a CONDITION when power is needed, no matter what the application may be.
2. To automatically STOP that engine when its power is no longer needed and to have it ready for the next POWER DEMAND.
3. To automatically PROTECT that engine, its accessories and the *equipment* it is driving, against any abnormal condition that may cause *damage* while it is running. Also to indicate the cause of any trouble should it occur.
4. To afford valuable SAVINGS by having a DEPENDABLE source of power always available.

If you are not familiar with the SAFETY and the ECONOMY provided by SYNCHRO-START CONTROLLED ENGINES, ask your engine manufacturer — engine dealer — engineering firm, architect, or write to us for free information and our nearest representative.

SYNCHRO-START PRODUCTS, INC.
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OVERSPEED GOVERNORS SOLENOIDS TIME ELEMENTS RELAYS SWITCHES SAFETY CONTROLS RECORDING CONTROLS PRE-SET AUTOMATIC OR MANUAL CONTROL SYSTEMS FOR INTERNAL COMBUSTION ENGINES

Tractor Engines—London Show

(*Continued from page 56*)

assemblies. Three Case machines shown by a London representative were models LA, DEX and DC4. This was largely a prestige display, as the U. K. does not grant currency allocations for American wheeled tractors. But spare parts may be obtained for the thousands of these machines already in service in this country.

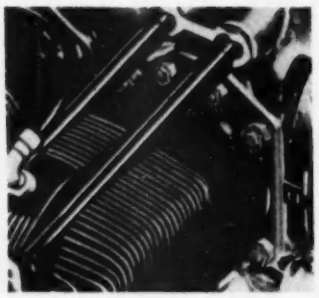
Strict control of dollar expenditures limits the British market for U. S. equipment, although International Harvester, Massey-Harris and Allis-Chalmers tractors are produced in quantity in Britain. Most recent addition to the International Harvester line is the B-TD6 Diesel crawler which was having its first British showing. This is the same as the U. S. model except for its engine. Production started in November at the recently-enlarged Doncaster works. It is expected that a large proportion of the output will be exported. Wheeled tractors made in the U. K. are the Farmall Super BMD and Farmall BM.

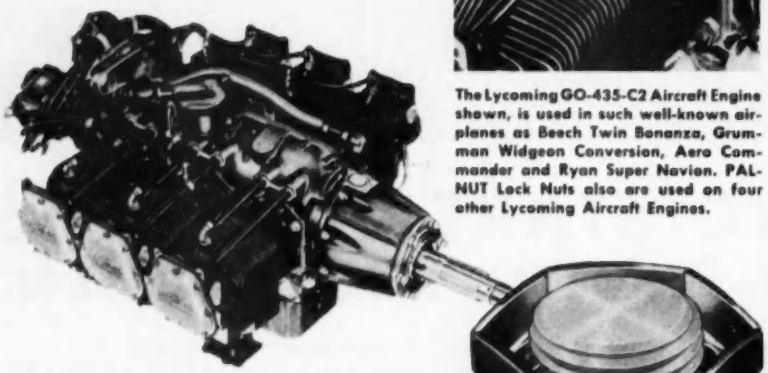
The Massey-Harris 744 is one of the largest wheeled tractors made in Britain. Powered by a Perkins P6 Diesel, it is rated at 36 drawbar hp and 5800 lb pull. It is available here as an all-purpose standard model, with elevated front axle or V-twin wheels for row-crop work, or as a half-track. The representative of Allis-Chalmers was showing the HD-5G fitted with a 1 cu yd Tracto-Shovel.

British imports from Europe are principally Italian and German makes. Two Fiat Diesel crawlers were exhibited, Models 55L and 35. In addition to the German Hanomag K55 and K90 tracklayers shown again in London this year there was the new Combitrac R12. This typifies advanced developments in Continental lightweights. Its single-cylinder, two-stroke Diesel of 31 cu in. piston displacement is rated at 12 bhp. Design features include six-speed gear box with additional reduction gear permitting creeping down to 0.37 mph, three-point hydraulic linkage, provision for mid- and front-mounted implements, differential lock, and double bench-type seats. Another German tractor exhibited was the Lanz Alldog tool carrier with rear-mounted single-cylinder Diesel.

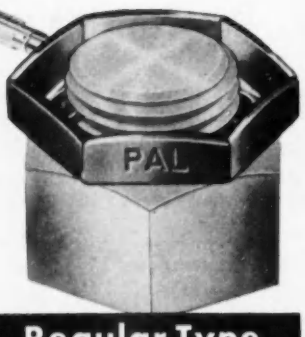
Where Assemblies dare not Fail!

In the famous Lycoming Engine all cylinder hold down studs are locked with Regular Type PALNUT LOCK NUTS





The Lycoming GO-435-C2 Aircraft Engine shown, is used in such well-known airplanes as Beech Twin Bonanza, Grumman Widgeon Conversion, Aero Commander and Ryan Super Navion. PALNUT Lock Nuts also are used on four other Lycoming Aircraft Engines.



Highest Security—at lowest cost!

A **PALNUT** Lock Nut on top of an ordinary nut, exerts a powerful double-locking spring action on both nut and bolt, that defies loosening under severest vibration. The cost is negligible—assembly is fast with hand or power tools—only three bolt threads needed—may be removed and re-used.

Regular Type PALNUT Lock Nuts are used on automotive connecting rods, main bearings, engine mountings, brake parts, body hold down, shock absorber mounting, transmission housing and many other critical assemblies. Send for Bulletin #577 and free samples.

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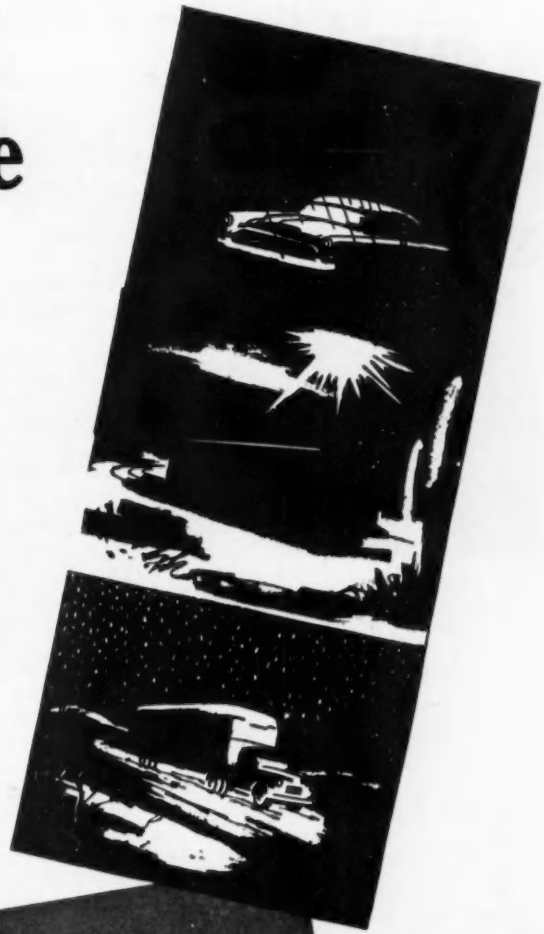
Other PALNUTS for Light Assemblies
cut costs, speed assembly of moulding strips, ornaments, nameplates, medallions, instrument assemblies, glove compartment and light sheet metal assemblies. Get Catalog #573 showing full line.

BOOKS . . .

AUTOMOTIVE MECHANICS, *by Joseph Heitner, published by D. Van Nostrand Co., Inc., 250 Fourth Ave., New York 3, N. Y. Price, $6.00.* Three whole chapters on the automatic and semi-automatic transmission are important features of this book. It provides in simple form a complete understanding of the construction and operating principles of the modern motor vehicle, as well as up-to-date methods of maintaining and repairing automobiles and scientific ways of diagnosing troubles.

TECHNIQUE AUTOMOBILE, *by J. Chagette, published by Dunod Publishers, 92 Rue Bonaparte, Paris, France. Price, $10.00.* This book represents a compilation of all important material regarding the construction and operation of automobiles. It is directed at readers who wish to acquire knowledge more advanced than that provided in elementary manuals. Each chapter is broken up into distinct subdivisions, and each topic is thoroughly explained and illustrated. In the studies of various types of vehicles, particular stress is laid on their respective engines, both from a design and an operational point of view.

more dependable starting *under all operating conditions*



"No Kick-Out" feature sets new standards in starting performance.

●Since the earliest days of the automotive industry Bendix* Starter Drives have been noted for reliable starting.

Now with the new and latest Bendix Folo-Thru Starter Drive, starting, even under the most adverse weather conditions, has been improved immeasurably.

Although this new Bendix Starter Drive is fundamentally similar to its illustrious predecessors, it is specially designed to follow through the weak explosions until the engine actually runs on its own power.

That's why cars, trucks and buses equipped with the Bendix Folo-Thru Drive are easier and quicker to start under all operating conditions.

*REG. U.S. PAT. OFF.

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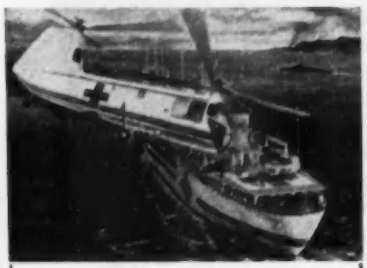
Bendix folo-thru starter drive

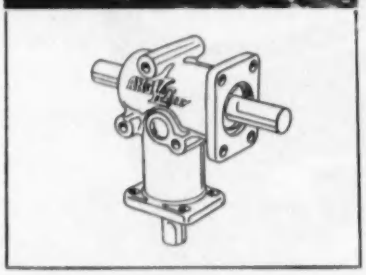
costs less —*The new Folo-Thru Drive requires no actuating linkage and the less expensive solenoid may be placed in any convenient position. Results are lower installation costs and no adjustments. Complete detailed information is available on request.*

Bendix* Folo-Thru Starter Drive **Bendix* Automotive Electric Fuel Pump** **Stromberg* Aerequad Carburetor**

ANGLgear
TRADE MARK

SERVES IN NAVY'S HUP-2





This right angle drive is part of the control system for the fuel shut-off valve. ANGLgear is often the choice when compact design and high capacity are required. These qualities make it a favorite among designers—specified equipment in many aircraft.

Model R-300 is rated at 1/3 hp at 1800 rpm—Model R-320 at 1 hp. Both models have hardened gears and ball bearings, are lubricated for life. Both are made with 1:1 ratio and with 2-way or 3-way shaft extensions.

ANGLgears are described fully in the I.A.S. Aeronautical Engineering Catalog. Refer to this publication for complete information, or write us direct.

AIRBORNE
ACCESSORIES CORPORATION
1414 Chestnut Avenue
Hillside 5, New Jersey

Wright Engine Production

(*Continued from page 47*)

the grinding of bores in the crankcase assembly to assure perfect axial alignment of bores in the two end sections. This is done in one of the outsized Bryant internal grinders. In operation, the outer end is ground first, then the section is removed to permit the spindle to reach into the bore of the inner section. The overall length of the assembly is about 21 in. in length and axial alignment of the end bores is held to a total tolerance of 0.001 in.

While on the subject of quality control, consider the three-piece crankshaft assembly. On one operation, pin grinding in a large Landis grinder, it is necessary to hold the pins to plus or minus 0.0005 in. on diameter and 0.0004 in. for parallelism.

It goes without saying that all parts are inspected 100 per cent to assure conformity to quality control. What this means in many instances is illustrated in the view, reproduced on page 44, of final inspection of the nose section. As shown, the checking fixture has a total of some 19 indicator gages designed to check the bores and mating face for concentricity and parallelism.

Japanese Study Jeep Production at Willys

Two engineering officials of Mitsubishi Heavy Industries, Reorganized, Ltd., one of Japan's largest manufacturing concerns, have been studying Jeep production at the Willys Motors, Inc. plant in Toledo, preliminary to beginning production of the Willys utility line in Japan. Their visit was made primarily to determine what engineers Mitsubishi should send here and for what purpose.

Under the agreement announced recently by Willys and Mitsubishi, the Japanese company will begin the manufacture of its own parts to Willys' specifications as quickly as possible. All of the Willys utility line will be produced from Japan-made material in the near future.

Vehicle bodies and chassis now are being produced in a plant located in Nagaya, Japan, which also will assemble the vehicles. A plant in Kyoto eventually will make the engine and drive line parts. Other Mitsubishi plants later will join in producing parts for the utility line.

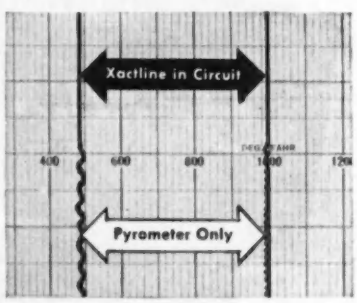
Make Your Temperature CONTROL More EXACT

It's Easy with XACTLINE

and it's automatic . . .

Your present indicating or recording pyrometer controls can be made to function more precisely—minimizing overshooting and undershooting—to meet the closest temperature-control requirement.

Simply introducing the XACTLINE into the control circuit will give you this "Straight-Line" temperature control. It automatically anticipates temperature changes before they occur—producing a short on-off cycle. Unusually sensitive performance is due to the complete electric operation—no moving mechanical parts. No adjustment or coordination with the control instrument is necessary regardless of the size of the furnace—electric or fuel fired—length of the heating cycle, or size of the load.



Exact reproduction of temperature chart for a heating process showing the comparison of the "Straight-Line" temperature control produced by XACTLINE and the saw-tooth curve obtained with only conventional control.

PRICE $89.50 F.O.B. CHICAGO
115 or 230 Volts, 60 Cycle.
Complete installation instructions. 4321

GORDON SERVICE

CLAUD S. GORDON CO.
Manufacturers • Engineers • Distributors
Metallurgical Testing Machines • Temperature Control Instruments • Thermocouples & Accessories • Industrial Furnaces & Ovens
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In this Modern Automobile Engine Plant

Wherever you look.....

you'll see VICKERS® HYDRAULICS

Here is a scale model of the production line area of one of the most modern automobile engine plants ever built. Having a capacity of 100 V8 engines per hour, it is equipped with time-and-money-saving machinery for automation.

Wherever you look in this plant you'll see Vickers Hydraulics. This is indicated on the photograph by the lines leading out from the Vickers-equipped machines to the names of their makers. It is an interesting study . . . first for the variety of machines . . . second for the large number of builders who use Vickers Hydraulics. Vickers Hydraulics is often the ideal solution to the myriad problems of feed, control, transfer, synchronization, etc. which must be dealt with in a highly automatized plant such as this. Hydraulic power can be developed wherever most convenient and applied at any other location. Simplification of design, flexibility of control, instantaneous response, rapid operation, ease of providing interlocks and overload protection, low maintenance . . . all are characteristics of Vickers Hydraulic Systems.

Do your machines have Vickers Hydraulics? The Vickers Application Engineer near you will be glad to discuss the many advantages.

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AUTOMOTIVE OUTLOOK for 1954

(*Continued from page 33*)

the same level as now, roughly at about one-third. Outstanding automotive installment credit today stands at about 4 per cent of disposable income compared with 3 per cent before World War II. Automobile industry officials believe that in view of the high national income, credit curbs can be eased somewhat without imperiling sound financing. It is estimated that 75 per cent of all car sales next year will be on time payments.

Dealer-Factory Relations

More will be heard this year about dealer factory relations as the competitive race grows hotter. During the lush prewar years when sales were no problem very little was heard on this score but in the past few months with the return of the buyers market the old complaints about factory pressure have been cropping up with frequency.

Militant dealer groups already have attempted to enlist the aid of the Justice Department to investigate such alleged practices and another group has made some headway with Senator Dougles of Illinois on a request for a Senate small business committee investigation of overloading dealers with excessive stocks of cars.

Also, independent parts wholesalers are complaining to FTC that automobile factories coerce their dealers in regard to handling factory parts to the disadvantage of the independent jobbers. In fact, automobile manufacturers have been asked by FTC for their sales literature and dealer promotion material, indicating that an investigation already is under way.

Such dealer complaints are not new to the industry and strained relations were to be expected after the many years of easy selling and high profits enjoyed by dealers. Many of them naturally are not happy at the realities of the competitive market and understandably are resisting taking more cars into their inventories than they can sell easily and at full profit. Dealer dissatisfaction with the factories is just one more evidence that the industry is fast returning to the normal market conditions that prevailed during peacetime years before the war.

New Models

This year may see the introduction of new models at an earlier date than has been customary in the immediate past, but according to the best information available it will not be in late summer as some observers are reporting. Nineteen fifty-five models will feature more completely new cars, styling and chassis-wise, than in any year since the end of the war. At least two new engines are slated for next year's models and most of the Big Three lines will have new styling. Nineteen fifty-five models also may include at least one new car in the Ford line and possibly two.

The trend toward more and costlier accessories is expected to continue this year despite the leveling off of the market. The demand for automatic transmissions, power steering, power brakes, air conditioning, tinted

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SPECIAL APPLICATION FRACTIONAL HORSEPOWER MOTOR

• You depend on your engineering department to design the products you sell.

With the same confidence you can depend on our engineering department to design electric motors to meet your exact mechanical and electrical requirements.

Your engineers and ours working together can develop a product that will be outstanding in performance, dependability and appearance.

To obtain the maximum benefits from this teamwork we should get together while your product is still in the design stage.

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Aircraft hydraulic pump motor with maximum output, minimum weight. Adaptable to many heavy-duty industrial applications.

Lightweight universal motor for portable devices requiring a self-ventilated, high-speed motor.

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SPECIAL APPLICATION FRACTIONAL HORSEPOWER MOTORS

What makes a

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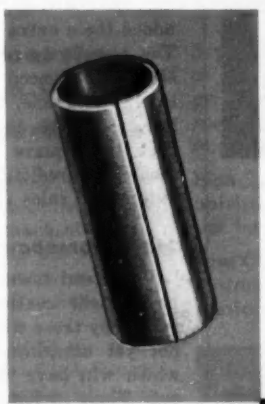
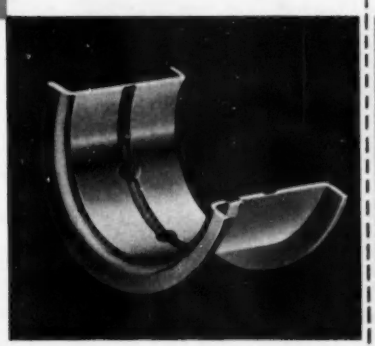
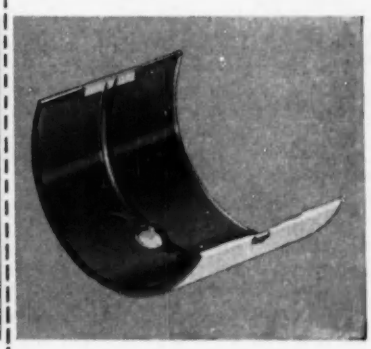
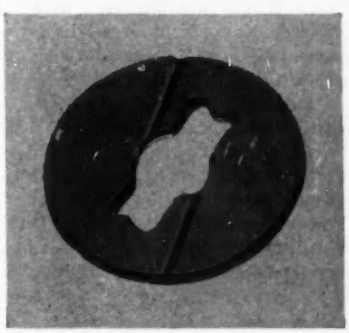


. . . it's management that is sensitive to your problems and requirements . . . it's enterprising research . . . it's resourceful engineering . . . it's dependable production . . . it's a record of over 50 years' growth through conscientious service. Your inquiry is invited.

This useful reference catalog on all types of sleeve bearings, bushings, precision bronze parts, washers and spacer tubes is sent free, on your letterhead request.





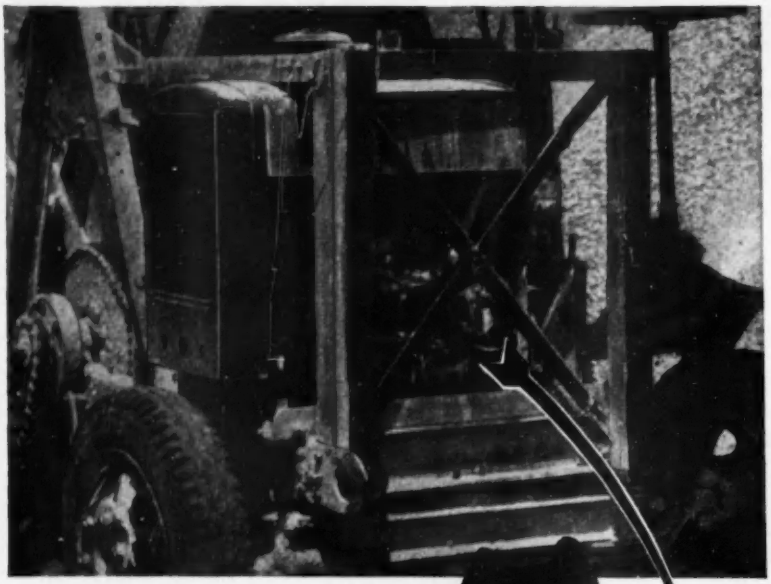


FEDERAL-MOGUL FEDERAL Mogul since 1899

FEDERAL-MOGUL CORP., 11037 SHOEMAKER, DETROIT 13, MICH.

Power you can punish!

That's LE ROI heavy-duty power



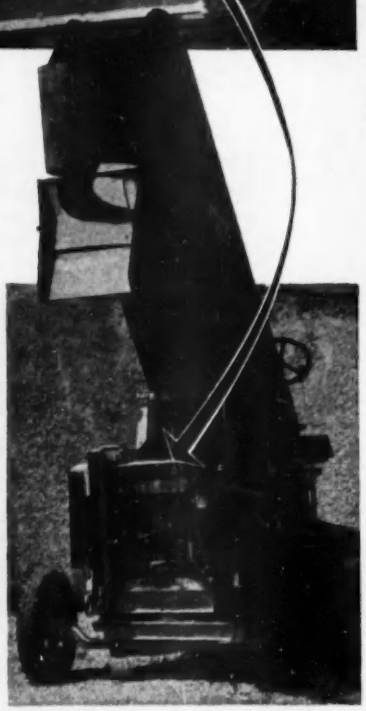
Power that pays off in
Dependable service!
Operating economy!
Easy maintenance!

THE extra reliability of Le Roi engines is a proved fact — proven by dependable and economical performance on one tough job after another.

A Le Roi is no automotive lightweight — it's a power-packed valve-in-head engine designed from scratch for *heavy-duty* service. It has the weight and stamina it takes to stand the punishment handed out to field equipment. It has advanced design, precision machining, and quick-maintenance features.

These are reasons why Le Roi is a leader in the heavy-duty field. They're reasons why you find so many Le Roi engines powering oilfield equipment, construction equipment, industrial machinery, and agricultural equipment.

Let Le Roi's performance record guide your judgment, when you buy equipment or select engines for original-equipment or replacement power. Le Roi has a full range of sizes from 15 to 635-hp — for gasoline, natural gas, butane. And remember — Le Roi power is power that pays off.



A typical Le Roi engine application in the construction field—powering a Haiss loader.

Write for latest bulletins.

LE ROI COMPANY

A Subsidiary of Westinghouse Air Brake Co.

MILWAUKEE 14, WISCONSIN

K-88

Plants: Milwaukee • Cleveland — Greenwich — Dunkirk, Ohio • Coldwater, Michigan

glass and multiple seat adjusters is expected to show the continuing uptrend evident in 1953.

Extra-Cost Devices

More automatic transmissions were sold last year than at any time in history, numbering more than 2.5 million. Power brakes during the year increased from 115,000 in 1952 to about 550,000 last year. Most phenominal increase was in power steering with installations totaling 600,000 in the first nine months of 1953, three times the total for all of the previous year. As a result of all of the continuing trend toward these extra-cost devices, the total average selling price of automobiles as a package is expected to increase again this year in relation to the base price of the car.

The success of ultra deluxe models last year has prompted other companies which did not have them to add them to their lines for 1954. Ford, Plymouth, Dodge and Pontiac are among the companies which have added these extra cost models in 1954. The popularity of these luxury models, as evidenced by Chevrolet with its Bel Air line, indicates an underlying strength in the market which does not square with some of the gloomier predictions prevailing for automobile sales this year.

More Horsepower

The trend toward increased horsepower will continue this year primarily by those companies which have not yet announced new engines but which will have them before 1954 is out. These include Chevrolet, Pontiac and possibly Plymouth. Each of these can be expected to bring out engines with horsepowers in line with their particular price class. Whether or not maximum horsepower, currently represented by Chrysler with 235 horsepower, will increase any this year is problematical. It would seem that if there is an increase at the upper end it probably will not be a very large one.

This year is the first time automatic drives are expected to go on at least 50 per cent of all passenger cars built. All makes, with the exception of the Henry J, will offer an automatic drive of some type. All with the exception of Plymouth will be fully automatic and it is highly probable that before the end of this year Plymouth also will adopt the PowerFlite transmission. A new type of automatic transmission is under development at General Motors but there is no indication yet whether it will be ready for 1955 models.

Production Pointers from GISHOLT

TIME-SAVING IDEAS

Presented as a service to production men, we hope some of these interesting ideas, chosen from thousands of jobs, will suggest ways to help you cut time and costs in your own work.

FOUND: A FAR BETTER SURFACE FINISH FOR VITAL TRANSMISSION PARTS

Superfinish Does the Job in One High-Speed, Automatic Operation

The demand for automatic transmissions in today's automobiles poses new problems in the machining and surface finishing of vital parts. Take this sun gear shaft: four separate bearing surfaces require ultra-fine finish to assure maximum life.

Superfinish proved to be the solution. A standard Model 51-A Superfinisher was modified for the job. Four quills, each with its own stoneholder and stones, were added along with a special workholder and driver.

MEETS ALL 3 REQUIREMENTS

Accuracy: All four surfaces are done at once—Superfinished down to 5 micro-inches from a 15 micro-inch grind. With the automatic cycle, there is precisely the same stock removal and surface finish time after time.

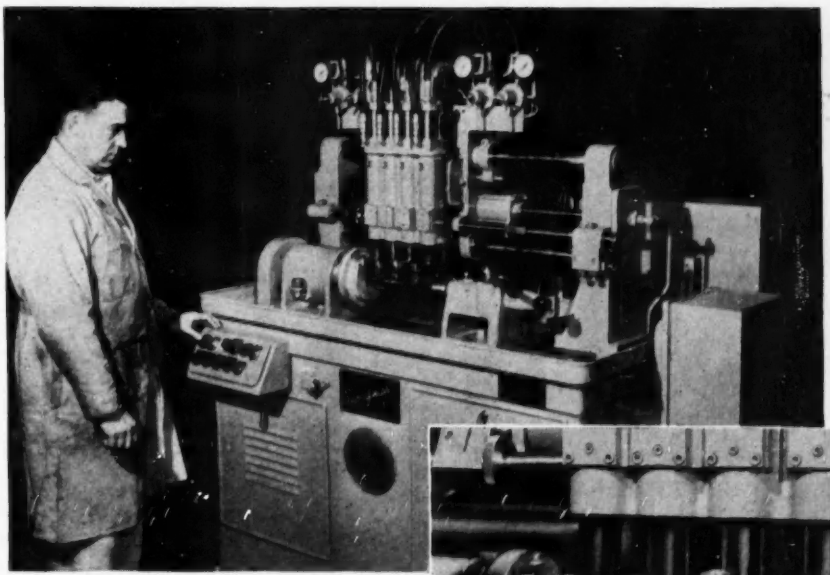
FACTS ON TWENTY JOBS—with photos and complete information are given in this brand-new Superfinish Catalog, just printed. The many typical applications will show how Superfinish can help you—in achieving better quality surface at low costs. Write for your copy today.

Superfinish rids the bearing surfaces of all annealed "smear metal" and grinding flats. Surfaces are true base metal, assuring absolute maximum bearing life.

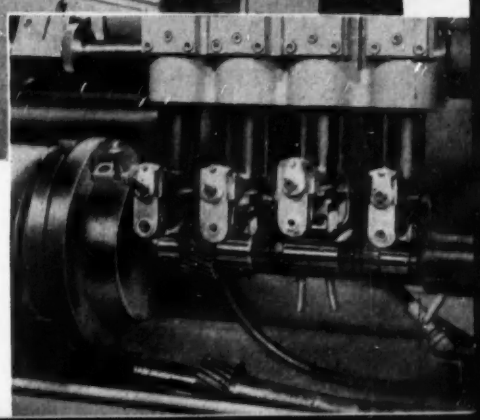
High-Speed Output: The single Superfinisher produces 75 completed shafts per hour at 85% efficiency.

Low Costs: With the low machine investment and the fast automatic operation of the Superfinisher, production costs are very low. Because Superfinishing takes the place of a final grinding operation, costs are actually lower—yet surface finish is far better and longer lasting.

Here, with both low machine investment and low production costs, vital transmission parts get far better, smoother, longer lasting surfaces.



The Superfinisher is fully automatic. After loading, operator starts cycle merely by pressing a button.



Four bearing surfaces are Superfinished simultaneously at a rate of 75 pieces per hour.

GISHOLT

TIME-SAVING IDEAS

WORKING ALL ANGLES TO CUT COSTS ON DRILL BIT BLANKS

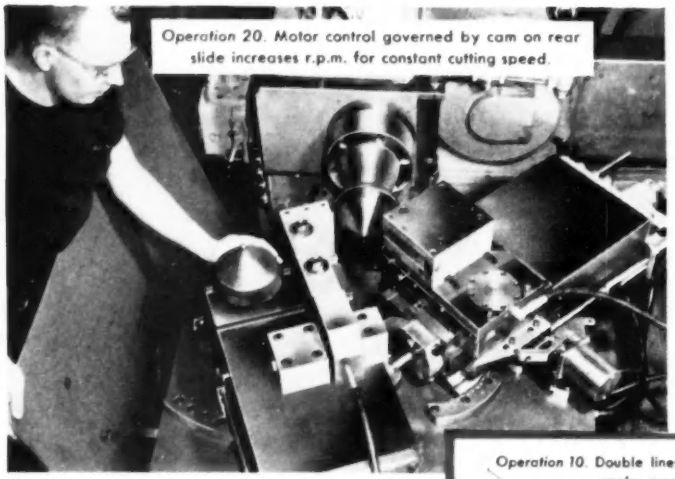
No. 12 Hydraulic Lathes Adjust Quickly for Many Different Parts and Angles

The question to be answered by this producer was how to most efficiently machine similar parts having dissimilar angles . . . and get easy changeover to other sizes. The workpieces are hard steel cone blanks; the finished products are oil well drill bits.

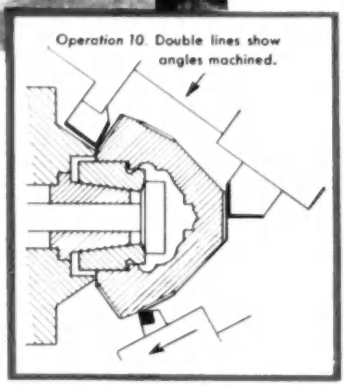
Because of the variety of sizes involved with each type having multiple angles, the practical solution was a pair of No. 12 Hydraulic Automatic Lathes. These are operated by one man. Changeover is simple with tool slides mounted on swivel bases.

A typical setup for operation 10 is shown in the tooling layout. Both front and rear slides can be adjusted to the required angles. The work on this 6½" cone takes less than a minute and a half, f.t.f.

Operation 20 is shown in the photo. Again the front and rear slides are mounted on swivel bases. The rear slide turns the long cone, and a special motor control speeds up the spindle to give a nearly constant cutting speed as the tool approaches the cone point. A fine finish and excellent tool life is the result. The front slide turns in the conventional manner. Floor-to-floor time is just over a minute.



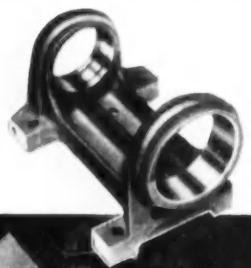
Operation 20. Motor control governed by cam on rear slide increases r.p.m. for constant cutting speed.

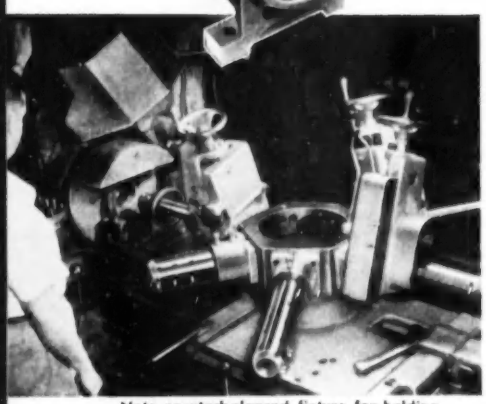


Operation 10. Double lines show angles machined.

Having slides that pivot is a big time saver in changeover of the No. 12 Hydraulic Automatic Lathes to other parts with different angles.

HOW THIS AWKWARD PART IS MACHINED WITH EASE





Note counterbalanced fixture for holding awkward part.

Unusual Job Efficiently Handled on Turret Lathe

How to handle this awkward, unbalanced part on a general-purpose turret lathe? Good planning and a 2L Saddle Type Turret Lathe provided the solution.

A special angle plate fixture with locating feet was built to hold the long rotor shaft housing. This eliminates chucking strain and insures that both bores will be round, concentric and in line. The counterweighted fixture is dynamically balanced with the workpiece to permit the high spindle speeds required for volume output and proper finish.

Tools are simple. Vertical slide tools handle all recessing, and boring bars take care of the two diameters. Time is 8.6 minutes floor-to-floor. Changeover for other size housings is simple.

★ ★ ★ ★ ★ ★ ★ ★

Doing boring and recessing on this clumsy part is a simple operation on the saddle type lathe with special holding fixture.

GISHOLT

TIME-SAVING IDEAS

GETTING A FIRM GRIP ON FRAGILE PART

Fastermatic Sets Fast Pace on Light Frame

Rough piece (left) and finished parts.

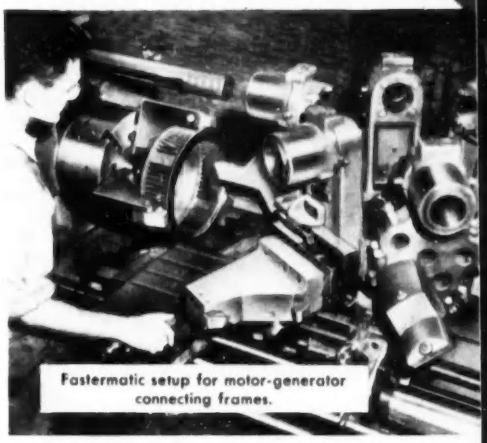
Thin-wall parts are usually a problem. But, in this case, the job is doubly tough because the workpiece is a welded assembly and has an open frame. Bores must be concentric and the faces parallel.

Devising a holding fixture was a routine matter, with Gisholt's long experience as a builder of lathes and chucks providing a "stock answer." A standard 15" 3-jaw air chuck assures speedy operation and controlled chucking pressure. Extended jaws permit pressure to be applied by rocker-type jaw ends on the front and back rings. This centers the workpiece and equalizes pressure at all points, avoiding distortion.

A 2F Fastermatic Automatic Turret Lathe handles the job. To avoid possible distortion from excessive stock removal, rough and finish cuts are made on both bores and faces. Special long tool holders carry tool bits for simultaneously machining the front and back surfaces.

The job is completed in the excellent time of only 5.5 minutes—with the automatic cycle of the Fastermatic enabling the operator to run other machines.

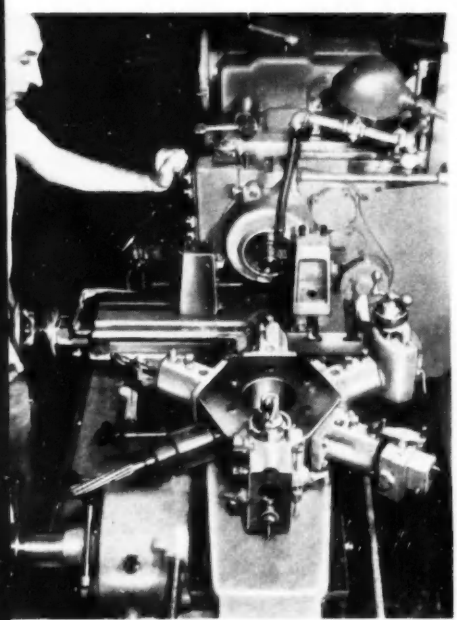
Fragile parts are quickly produced with repetitive accuracy, thanks to well-planned chucking and the automatic cycle of the Fastermatic.



Fastermatic setup for motor-generator connecting frames.

BUSINESS-LIKE SETUP FOR MACHINING BUSHINGS ON TURRET LATHE

Ram Type Machine Has Standard Hydraulically Actuated Collet Chuck and Bar Feed



Setup for efficient machining of stainless steel bushings.

Here's a fast, simple, low-cost way for machining 1¼" ring seal bushings. The job is done in a single operation on a No. 4 Ram Type Turret Lathe.

To start, the stainless steel bar stock is advanced through the spindle and held in the collet chuck. Both movement and clamping are hydraulically actuated—saving both time and effort.

The first station on the hexagon turret is a stock stop. The next two stations are used for conventional drilling and reaming. A vertical slide tool, seen in the foreground of the photo, carries a hook cutter and catches the first recess in the bore. The turning of the straight OD from the cross slide is then combined with the five-degree chamfer from the hexagon turret. The second recess in the bore is formed from the sixth station. Cut-off tool at rear of cross slide completes the operation.

Well-planned tooling with the advance and clamping of bar stock hydraulically controlled saves time and effort on this Ram Type Turret Lathe job.

GISHOLT

TIME-SAVING IDEAS

MASSIVE FLYWHEELS BALANCED FOR SMOOTH OPERATION

Direct Readings Show Unbalance Correction Required

The huge part you see here is a non-magnetic inertia flywheel for Navy Minesweepers. The problem is to make them smooth and quiet in operation. This means precision balancing which is readily done on a Gisholt DYNETRIC Floor Type Balancing Machine.

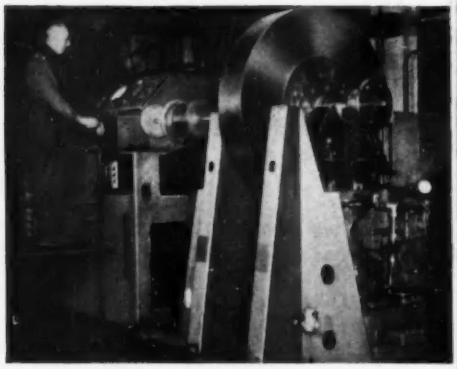
The flywheel assemblies weigh 5,200 lb. and measure 50" in diameter. Although the dynamic correction planes are only 9½" apart, the flywheels are easily balanced to less than 1 ounce inch in each plane. Correction for unbalance is made by grinding on the outer rim.

The flywheel is balanced on its own shafts and supported on its own bearings. Heavy oil pressure to the half bearings eliminates metal to metal contact and protects the arbor journals. Other rotating parts of the engines are also balanced to fine tolerances, assuring quiet, smooth operation of the final assembly.

Whether your problem is balancing large parts like these . . . or components weighing only ounces, there is the right Gisholt Balancer for the job.

"Floating" these heavy parts on pressurized half bearings not only protects the bearing journals, but facilitates precision balancing as well.

DYNETRIC BALANCERS

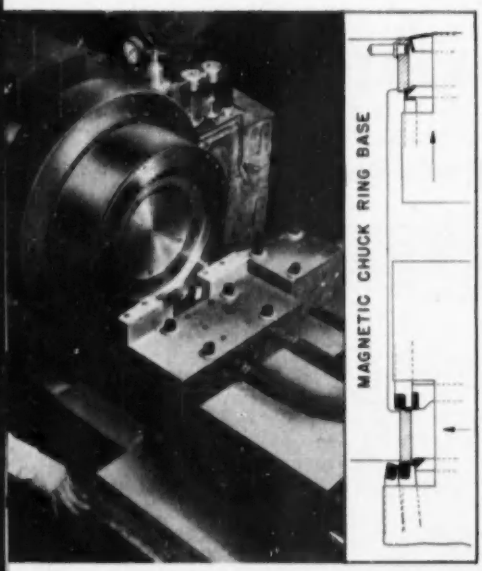


PRODUCTION BALANCING . . .

is only one of the many helpful subjects covered in the Gisholt Balancing School —only service of its kind available to industry. Ask for details.

HOW TO HOLD CRITICAL DIAMETERS ON LARGE, THIN PARTS

Standard Simplimatic with Special Chucking is the Answer



Tooling setup on two slides.

The workpiece is a flywheel cover plate. It's a difficult part, both to hold and machine.

Here's how the job is done:

Because of the thin-wall and wide diameter of the workpiece, a magnetic chuck with a ring base and locating pins is used. With the slightly smaller size of the base, the turning and boring tools have clearance to pass through the work.

For concentricity of the OD and ID, they are machined simultaneously —rough, finish and chamfer the OD; bore and counterbore the ID. Five tools mounted in a single tool block on the front slide handle this work while three tools on the rear slide move across to face, chamfer and groove the ID.

Time is an even 3 minutes floor-to-floor, showing the efficient setups you can have with the Simplimatic Automatic Lathe.

Smart chucking and simultaneous machining of the ID and OD aid greatly in achieving speed and accuracy on these delicate parts.

Many interesting jobs and tooling illustrations are shown in the helpful Simplimatic catalog. Ask for Bulletin 1159.

No. 1-254
615

THE GISHOLT ROUND TABLE represents the collective experience of specialists in the machining, surface-finishing and balancing of round and partly round parts. Your problems are welcomed here.

GISHOLT MACHINE COMPANY Madison 10, Wisconsin

TURRET LATHES • AUTOMATIC LATHES • SUPERFINISHERS • BALANCERS • SPECIAL MACHINES

CALENDAR

OF COMING SHOWS AND MEETINGS

National Motor Boat Show, Bronx, N. Y. ..... Jan. 15-23

General Motors Motorama, Waldorf Hotel, New York, N. Y. ... Jan. 21-26

World Motor Sports Show, New York, N. Y. .....Jan. 23-31

Plant Maintenance & Engineering Show, Chicago, Ill. ..... Jan. 25-28

Society of Plastic Engineers, 10th annual technical conference, Royal York Hotel, Toronto, Ont. .....Jan. 27-29

SPI Reinforced Plastics Division, ninth annual conference, Edgewater Beach Hotel, Chicago, Ill. .....Feb. 3-5

Chicago National Boat Show, Chicago, Ill. ....Feb. 5-14

International Motor Sports Show, New York, N. Y. .....Feb. 6-14

National Transport Vehicle Show and Fleet Maintenance Exposition, New York, N. Y.....Feb. 17-19

American Society for Testing Materials, spring meeting, Shoreham Hotel, Wash., D. C. .....March 1-5

SAE National Passenger Car, Body, and Materials Meeting, Hotel Statler, Detroit, Mich. .....March 2-4

American Society for Metals, midwinter meeting, Hotel Statler, Boston Mass. .....March 4-5

Pacific Automotive Show, Seattle, Wash. .....March 4-7

Geneva Automobile & Truck Show, Geneva, Switzerland .....Mar. 11-21

American Society of Lubrication Engineers, annual meeting and exhibit, Netherland-Plaza Hotel, Cincinnati, O. .....April 5-7

SAE National Aeronautic Meeting, Statler Hotel, New York, N. Y. .....April 12-15

International Motor Show, Turin, Italy .. ..April 21-May 2

ASTE Industrial Exposition, Philadelphia, Pa. .....April 26-30

American Welding Society, spring technical meeting, Hotel Statler, Buffalo, N. Y. .....May 4-7

International Aviation Trade Show, New York, N. Y. .....May 5-7

Annual Foundry Congress and Show, Cleveland, Ohio .....May 8-14

Basic Materials Exposition, Chicago, Ill. ..... May 17-20

Canadian International Trade Fair, Toronto, Canada ....May 31-June 11

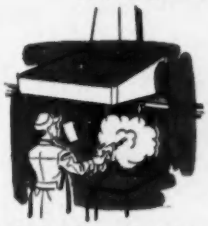
SAE Summer Meeting, Ambassador and Ritz-Carlton Hotels, Atlantic City, N. J. .....June 6-11

Society of the Plastics Industry, Sixth National Exposition, Cleveland, O. .....June 7-11

American Society for Testing Materials, annual meeting, Sherman Hotel, Chicago, Ill. .....June 13-18

WANT TO LOWER YOUR PAINTING COSTS?

...and get a better paint job, too? Check the RANSBURG Processes!



Let's say you're a manufacturer of some painted product. Size and shape aren't too important. You're already using a conveyorized set-up, but you want a better quality finish . . . increased production . . . at less cost.

You've heard about electrostatic spray and some of the phenomenal results being achieved by Ransburg on other production lines. You write or call . . . say you want to know what Electro-Spray painting can do for YOU.

Ransburg engineers will help you investigate the possibilities. They'll gather complete data on your present operation, and check your facilities and requirements. If Electro-Spray is feasible, you will send samples of your unpainted products—with paint—to the Ransburg laboratories in Indianapolis. The labs are completely equipped, and the Ransburg engineers and technicians have every facility at their disposal for conducting extensive tests, simulating your production conditions.

After the priliminary studies and tests, you are invited to see your job run in the Ransburg Labs. There's no guesswork. You'll see the actual results. Paint and labor savings are determined. You can check the improved, uniform quality, and you'll be furnished drawings, showing the proposed installation for your own plant.

ALL OF THIS WITHOUT OBLIGATION TO YOU!

After the Electro-Spray equipment is installed, Ransburg will continue to work with your finishing department. Ransburg engineers—men skilled in electrostatic spray painting—are always available to work with you on any problem which might arise in your finishing department. Fair enough? Let us hear from you.

RANSBURG

Ransburg **ELECTRO-COATING CORP.**

INDIANAPOLIS 7, INDIANA

Aviation Prospects for 1954

(*Continued from page* 41)

1. The substantial reduction in the 1954 national defense budget, especially in appropriations for procurement of aircraft which amounted to some $4 billions;

2. The broad reorganization of Governmental mobilization responsibilities; A reprogramming of aircraft procurement which eliminated from future production schedules certain older aircraft types to provide added funds to increase orders for newer models;

The policy of the new Administration to narrow and deepen the production base which resulted in the phasing out of many of the major subcontractors and licensees who had been brought into aircraft manufacture during the post-Korean expansion.

As many military requirements were reduced and as the nation's basic industrial capacity was expanded. controls on wages and prices were removed. Direct controls over materials were eliminated and a system of priorities an dallocations was established to insure that the requirements of defense production were met. In the materials field the major problem now confronting government and industry is the shortage of titanium. Although industry materials experts indicate a requirement of at least 250,000 tons by 1960, titanium production in 1953 was only some 2000 tons.

Military Aircraft Production

Although military security restrictions on defense production information preclude the release of detailed information on the industry's production activities, military plane output is estimated at approximately 12,000 units of all types during the past year.

This production brings the total of military aircraft produced since the Korean hostilities began to more than 27,500 units. By years, the estimates are as follows:

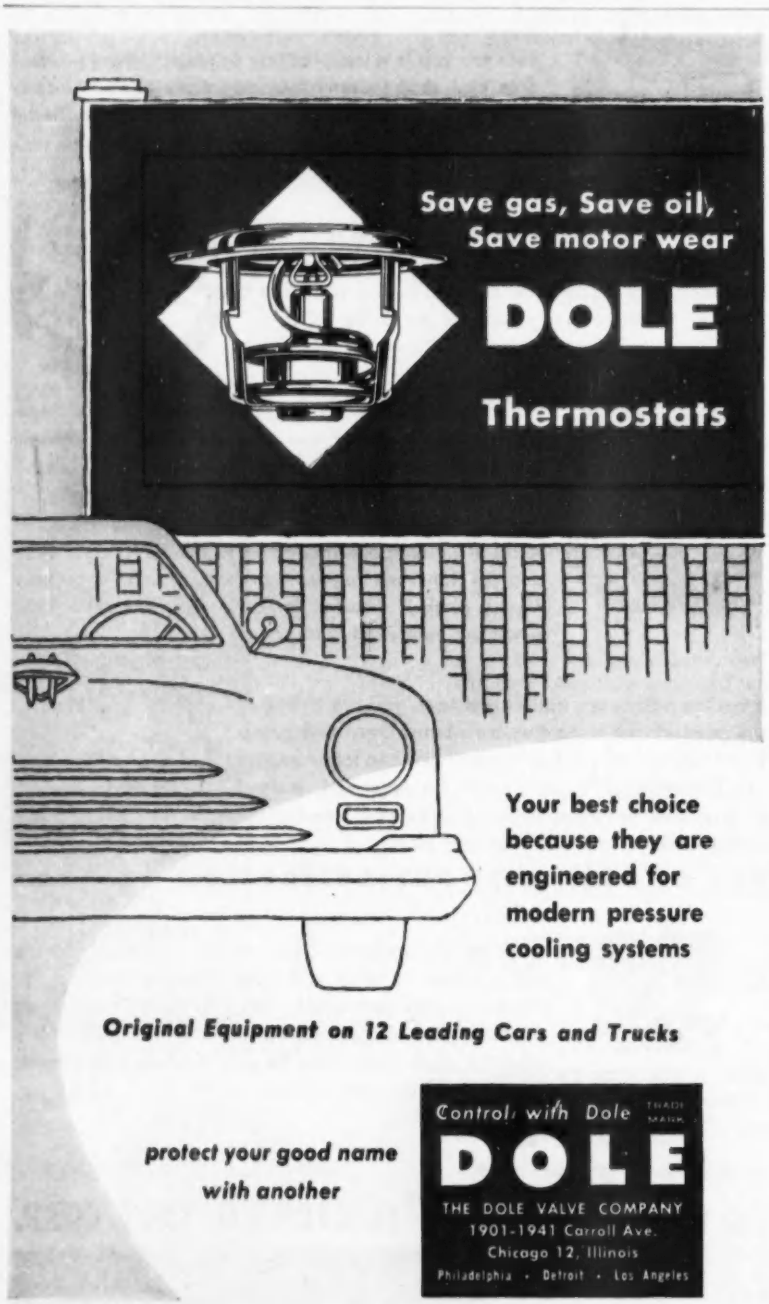
1950—slightly less than 3000, of which some 1500 were built after June, 1950.
1951—more than 5000.
1952—approximately 9000.
1953—approximately 12,000.

In this connection it is pertinent to note that the percentage of combat types (fighters and bombers) has been constantly increasing and during the past year, for the first time, the number of jet powered planes produced exceeded piston-engined plane production.

In addition to this piloted airplane production, the industry increased its activity in the guided missiles field as several new types were being delivered on a production basis. At the year's end, unfilled orders for missiles were well over a billion dollars, although deliveries had gained momentum each month.

Helicopter Production at All-Time High

Although production of military planes represents approximately 95 per cent of the aircraft manufactur-


Save gas, Save oil,
Save motor wear
DOLE
Thermostats
Your best choice because they are engineered for modern pressure cooling systems
Original Equipment on 12 Leading Cars and Trucks
protect your good name with another
Control with Dole
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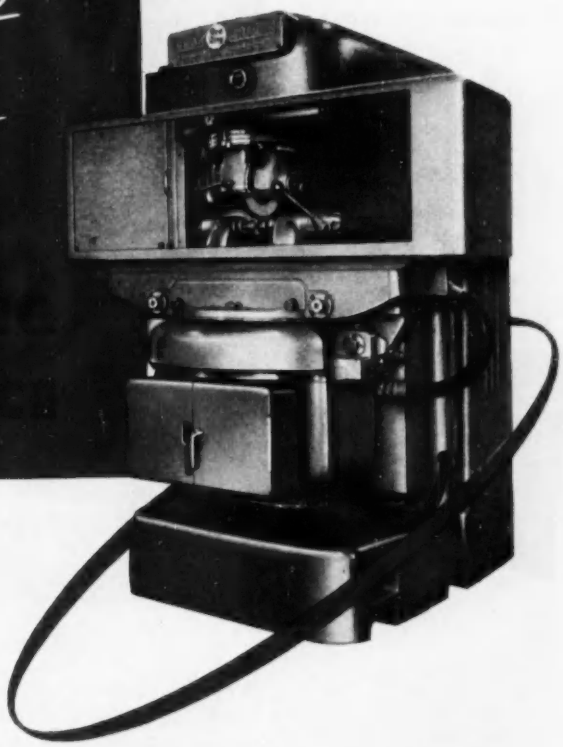
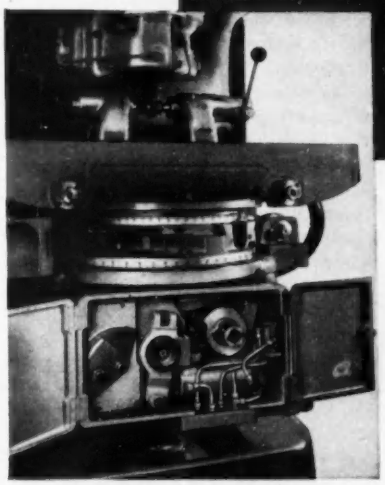
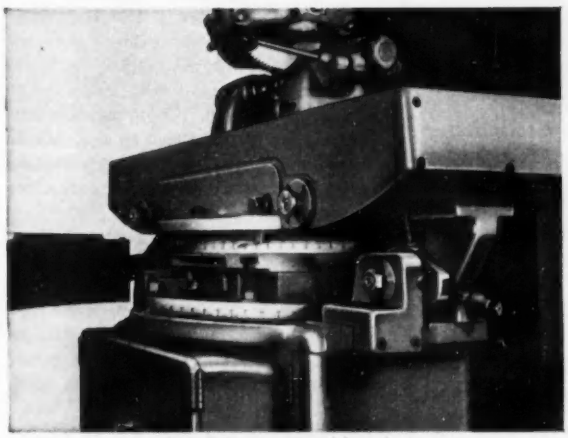
An Important Contribution





Differential up-feed mechanism



Crowning cam and bracket

Two new features are now optionally available with the Red Ring Gear Shaving Machine Model GCU — Automatic Differential Up-feed and Conventional Crowning. So equipped, any of the recognized processes in the field of rotary gear shaving may be performed on this machine. It thus becomes economically applicable to both high production and to job shop operations and to gears of all characteristics within its size range.

Specifically the Model GCU with these additions can be used for:

(1) Diagonal shaving at fixed center distance on a two stroke cycle.
(2) Diagonal shaving on an automatic multi-stroke cycle with selected increments of up-feed and dwell.
(3) Conventional shaving on an automatic multi-stroke cycle with selected increments of up-feed and dwell.
(4) Precision gear crowning accomplished by rocking the table during any conventional shaving cycle.
(5) Taper shaving to specification.

Automatic cycling is precise and very fast. Production rates are high and cutter life has been increased to as much as 200%.

Write for Bulletin S53-7 which gives all the details of this important new development.

6501

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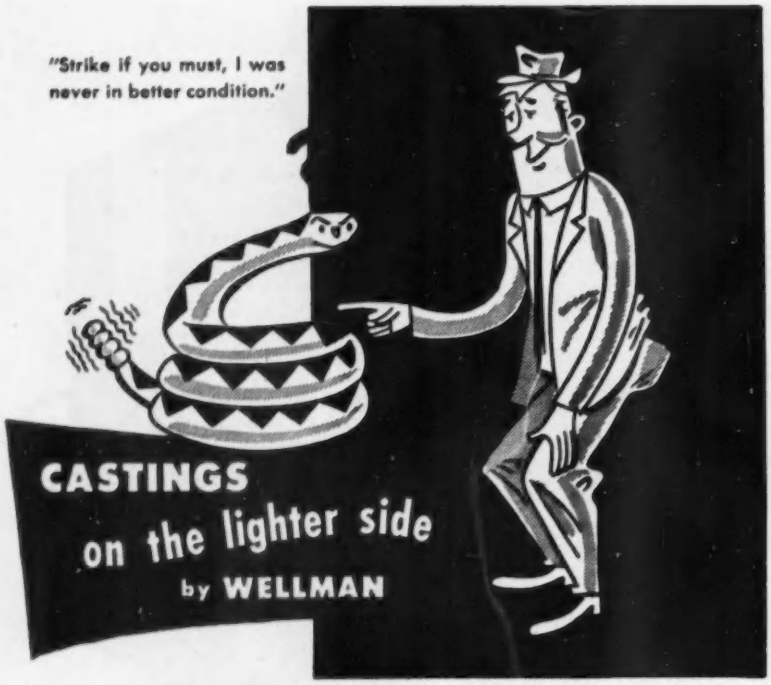
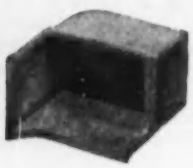
NATIONAL BROACH & MACHINE CO.

5600 ST. JEAN . . . . . DETROIT 13, MICHIGAN

WORLD'S LARGEST PRODUCER OF GEAR SHAVING EQUIPMENT

"Strike if you must, I was never in better condition."





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Our four completely equipped plants and staff of competent personnel enable us to offer you the finest production facilities.

Purchasing, engineering, production and management men in industries everywhere have found the name WELLMAN synonymous with sound castings made under close metallurgical control . . . complete facilities for a wide range of products . . . a sincere interest in their problems.

We'll be glad to send a representative to call, and in the meantime, our new catalog No. 53 will tell you more about us and our almost half century of experience.

Well-Cast MAGNESIUM AND ALUMINUM CASTINGS
Well-Made WOOD AND METAL PATTERNS

THE WELLMAN BRONZE & ALUMINUM CO.
Dept. 3, 12800 Shaker Boulevard Cleveland 20, Ohio

ing effort, civil aircraft production continued at a substantial rate. Transport aircraft production for the year is estimated at some 315 units, of which about 210 were twin-engined executive types and 105 were 36-passenger or larger types. Unfilled transport aircraft orders were in excess of 300 units at the year's end.

In the utility airplane field, production was increased by approximately 8.5 per cent over 1952 production. The increase in unit production of utility aircraft from 3509 in 1952 to an estimated 3800 in 1953 was marked by an even greater percentage increase in airframe weight as more and larger utility aircraft were sold for business purposes.

Helicopter production was at an all-time high and constantly increasing throughout the year. Since the preponderance of all helicopter production was for military customers, information is not available as to numbers produced. For the second consecutive year the helicopter manufacturers' backlog exceeded the half billion dollar mark and production for civil purposes was increasing.

Although production in terms of units remained constant throughout the year, the increase in the average airframe weight of aircraft produced was reflected in the gradual increase in employment. By August direct employment had increased to more than 755,000, compared to 711,000 on industry's payrolls in December, 1952. It is estimated that by December, 1953, some 770,000 workers were engaged in aircraft production—a threefold increase in direct employment since June, 1950. Counting the employees of subcontractors and major suppliers, the aircraft production work force is estimated at more than one million.

Sales volume of the twelve largest airframe companies is expected to exceed $5 billion in 1953, compared to 1952 sales of $3.731 billion. This represents an increase of 37 per cent in the past year and is the largest volume of sales reported by these companies since World War II.

Profits for the year are estimated at $102 million, or 2.3 per cent of profits to sales. This low level of profits to sales—compared to the 1952 average of 5.4 per cent for all manufacturing industries—again points to the need for increased financial strength, coupled with a long-range aircraft procurement program, if the aircraft industry is to possess the financial health and stability required to maintain the manufacturing-engi-

(*Turn to page* 102, *please*)

Every time—count upon

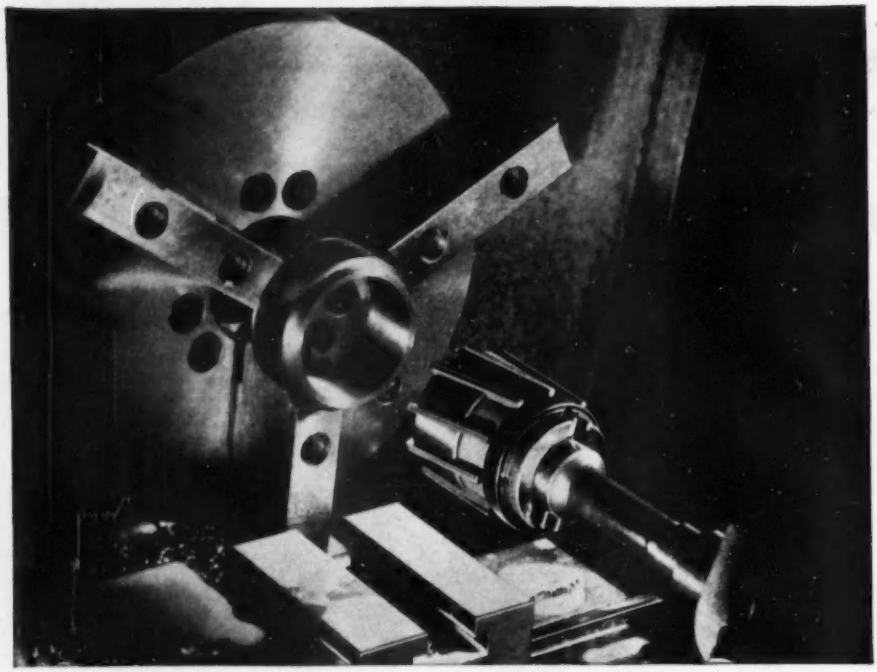
MOTCH & MERRYWEATHER Engineering for a clear advance in MACHINE TOOL DESIGN

Each machine tool built by us is charged with doing a specific job better than before and for less. To us that is a privilege—a challenge—an obligation. Every machine developed by the Motch & Merryweather engineering staff must earn a permanent place for itself in Industry—must contribute permanently to a nation's advance in point of efficiency and economy—must mark a visible step forward in machine tool design and construction . . . An example is outlined on this page.

This M & M duplex production single-purpose milling machine mills two tractor side bars while two others are being loaded (removing at same station). Actually mills 70% of the time; up to 268 side bars per hour @ 100%. Two heads move, not the operator. Rigidity and power (30 h.p.) hike output. Fixtures to suit.

Manufactured by — THE MOTCH & MERRYWEATHER MACHINERY CO. —
CLEVELAND 13, OHIO
Builders of Circular Sawing Equipment, Production Milling, Turning and Special Machines

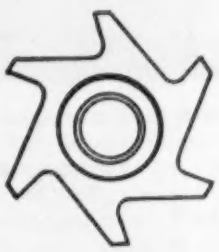
PRODUCTION-WITH-ACCURACY MACHINES AND EQUIPMENT



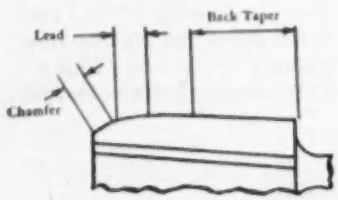
REAMER DESIGN Controls

Accuracy, Finish and Production

Barber-Colman Reamers produce finishes which were not previously considered possible on a standard production operation. Exceptional accuracy and tool life are also obtained on production runs as a result of the special features of Barber-Colman Reamers. Both solid-fluted and inserted-blade reamers are available.

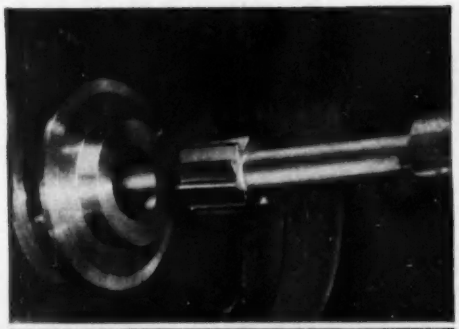


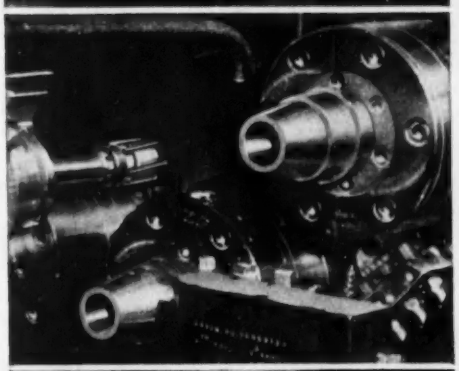
Irregular flute spacing provides a smooth cutting action and fine finish, and helps to prevent the reamer from forming "welts". As a standard feature on all Barber-Colman Reamers, flutes or blades are spaced diametrically opposite each other so that they are easily checked with a micrometer.

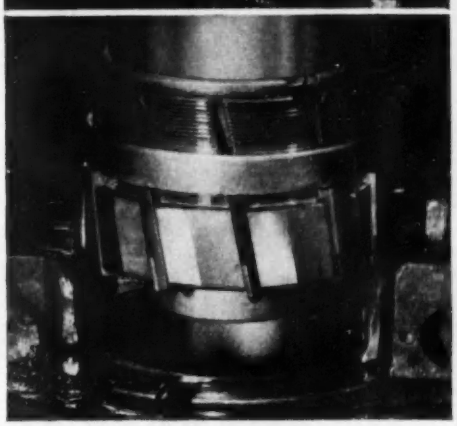


The profile form on Barber-Colman Reamers is designed to produce the best possible finish and tool life. Following the chamfer, the lead is blended into a radius to produce exceptionally fine finishes. Through Barber-Colman cam-controlled sharpening, a sharp cutting edge, rather than a cylindrical land, is produced, resulting in a freer cutting action. With this control, successive reamers are sharpened with exactly the same profile form and relief angles to provide exact duplication of size, straightness and roundness.

DESIGNERS OF STANDARD AND SPECIAL







20-25 micro-inch finish typical

On this job, 1000 pieces are reamed to a surface finish of 20-25 micro-inches before it is necessary to re-sharpen the reamer. The feed is 1.75" per minute at 280 rpm., requiring 30 seconds to ream the 7/8" length of cut. Material is AISI C1137 steel.

1500 pieces per sharpening

This carbide-tipped inserted-blade reamer produces from 1100 to 1500 pieces per sharpening while maintaining the finish better than 60 rms. Tolerance on hole size is .002". Stock removal is .012" to .015" on the diameter, and the material is B1117 steel. Speed is 105 sfm, and the feed is .0188" per revolution. A Barber-Colman Reamer Sharpener reproduces the correct profile on the reamer blades with each sharpening.

tool cost reduced from $1.57 to $1.32

These Barber-Colman Reamers are producing truck cylinder liners with accurate straight round holes free from welts or taper at a tool cost 15% less than previous records. Material is cast iron. Replaceable blades with carbide tips give long reamer life and cutting edges which stand up under continuous production. 675 more pieces per set of blades are now obtained, and tool cost per 100 liners has been reduced from $1.57 to $1.32.

If you are now choosing between accurate, quality-finish reamed holes — and low-cost production and tool maintenance — you can have both, using Barber-Colman Reamers. More flutes per cutting diameter, solidly backed cutting edges, and standard irregular flute spacing will give you tool room reaming quality under regular production conditions.

Send specifications on hole sizing and finishing problems to Barber-Colman engineers. They will furnish reamers for your particular requirements to give you the desired quality consistently.

HOBS • CUTTERS • REAMERS
HOBBING MACHINES
HOB SHARPENING MACHINES

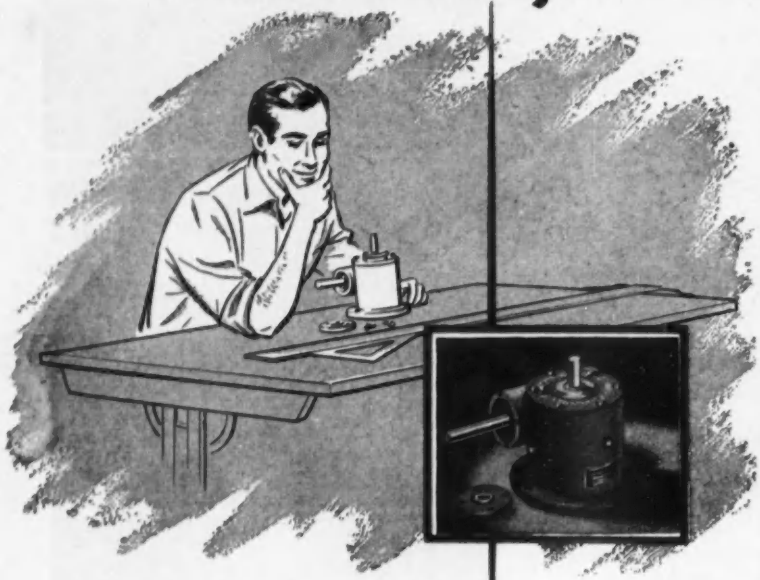
BARBER COLMAN

Barber-Colman Company

GENERAL OFFICES AND PLANT, 931 ROCK STREET, ROCKFORD, ILLINOIS

METAL CUTTING TOOLS SINCE 1908

which SCREW is best for this job?



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OVER 10,000 standard sizes, types, head styles and finishes are offered in Pheoll's complete line of screws, bolts and nuts. You can benefit through simplified ordering and stocking . . . centralized purchasing. Call Pheoll on your next order.

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SCREWS • NUTS • BOLTS • SPECIAL COLD HEADED PRODUCTS

(*Continued from page* 98)

neering teams and the research and development activity essential to the production of today's complex high-performance aircraft.

Among the outstanding accomplishments of American built aviation products during the past year were:

(1) A new unofficial world's speed record of more than 1600 mph.
(2) Deliveries of the first supersonic combat plane to go into volume production.
(3) The establishment of a new unofficial altitude record for man-carrying aircraft of 83,235 ft.
(4) Several aircraft exceeded 700 mph in attempts to set new official world's speed records, with 754.98 mph being the present official speed record.
(5) Volume production of a 10,000-lb thrust jet engine.

BOOKS . . .

ELEMENTS OF HEAT TREATMENT, *by George M. Enos and William E. Fontaine, published by John Wiley & Sons, Inc., 440 Fourth Ave., New York 16, N. Y. Price, $5.00.* Vividly illustrated and written in simple language, this volume provides a thorough grounding in the basic principles governing the application of heat to alter the mechanical properties of metals. The authors define the major heat treatment processes and show how each is used to get the metal characteristics needed for a specific job. Background information on the properties of metals and alloys is presented in order to develop the reader's appreciation of the changes wrought by heat treatment. Casting, forging, rolling, welding, machining, and other processes related directly or indirectly to heat treatment are briefly discussed.

General Motors Firebird

(*Continued from page* 43)

Front suspension is a double-wishbone type with torsion bar springing. A deDion type suspension is used in the rear. The axle is suspended with a single leaf spring anchored to the frame at the front and to a walking beam which is pivoted at the center of the frame at the rear for a stabilizing effect.

The Firebird has an overall length of 222.7 in. and a wheelbase of 100 in. Width is 80 in.; height at the top of the bubble over the driver's cockpit is 41 in. and at the top of the rear fin, 55 in.; tread is 54 in. front and 50 in. rear.

KEYBOARD FOR POWER!

Turning at hurricane speed, the camshaft of an engine plays a powerful tune. Its finger-like cams spin in sequence, deftly controlling the explosive diet of each plunging piston. But to perform its important task, a camshaft must excel in many ways . . . and therein lies a story of castings. Quite some years ago, Campbell, Wyant and Cannon realized the wealth of benefits in store for engine user and engine manufacturer if a camshaft could be cast successfully. So CWC put engineering and research to work . . . developed special electric furnace alloys far superior to any previously used materials.

Since that time, CWC has delivered over 40 million cast camshafts . . . saved engine builders well over 50 million dollars. In addition to being produced at lower cost, these camshafts are heat treated to resist corrosion and wear for the life of the engine. They need little machining, are easier to machine and actually extend design possibilities of the engine.

It will pay to consider castings for your product. Many others have found the most important step is to contact CWC.

CAMPBELL, WYANT AND CANNON
FOUNDRY COMPANY
Muskegon, Michigan
GRAY IRON, ALLOY IRON AND STEEL CASTINGS

The BUSINESS PULSE

(*Continued from page 78*)

in the final weeks of the year ran considerably below the levels of late 1952 and also below the 1953 average, with no likelihood of any near-term rise of appreciable proportions. Coal and lumber output also showed a marked lag in the final weeks of 1953 as compared with a year earlier, while electric-power production, although running above the 1952 level, was off substantially from earlier 1953 highs.

Upturn in Construction

One very notable exception to the general trend in the final part of 1953 was the construction industry. Declines here were generally of less than seasonal proportions, whereas earlier in the year slackening tendencies were in evidence. While it is too early as yet to judge whether the recent experience heralds a fundamental improvement of industry conditions, the upturn at least provides a hopeful note, welcome at a time when most indicators are slipping off.

These particular movements at the end of the year added up to a continuation of the slow downward drift in general business that had been under way since about midyear. By the year's end the cumulative loss in over-all industry as compared with peak rates for the year was probably in the neighborhood of four or six per cent. The index of business activity compiled by the Guaranty Trust Co., for example, was off by about 5½ per cent through November, and the Federal Reserve Board's index of industrial production on the old 1935-39 base was down by about the same percentage.

General Opinion

Average opinion seems to hold that the moderate decline of recent months will continue well into 1954, but that the over-all loss will not be of large magnitude. In other words, the general view is that the recession will be neither deep nor prolonged. This opinion seems to rest primarily on the apparently favorable tendencies—the relative stability, that is—in construction, business investment (other than in inventories) and Governmental outlay, and also on the fact that, so far at least, there has been no persuasive evidence of any appreciable letdown of consumer buying. While there has hardly been time as yet for a real test of this average view, it can at least be said that to date nothing which has occurred seems incompatible with it. To date, however, we have moved only a short distance below all-time peak rates of activity, so that spiraling forces—if there are to be any—have not had a chance to show themselves. In this connection, the developments of the next few months ought to be of particular significance.

Dissenting Views

A number of dissenting views have been expressed. Those who have taken exception to average opinion have, for the most part, cautioned that there does not seem to be adequate appreciation of the many uncertainties in the outlook. The various strengths and weaknesses, it is pointed out, appear to be in rather delicate balance, with some of the

Since the motor transport industry was in its infancy, Burton Springs have been relied upon to help carry the heavy goods of the nation. On both highway and off—highway vehicles, Burton Springs are installed as original equipment by leading manufacturers.

These manufacturers know that Burton Springs suit their needs perfectly. They are designed and engineered by experts and are produced under the most rigid standards of quality and workmanship. Our quality control methods insure maximum uniformity and provide unparalleled performance characteristics.

Our competent engineering staff is fully prepared to consult with you concerning your individual spring problem. Your effort will more than pay for itself.

Write to Burton today.

Put the Burden on Burt Basco

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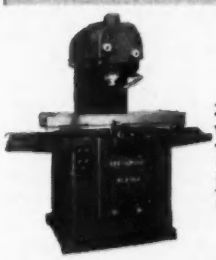
CUT MILLING COSTS WITH

KENT-OWENS

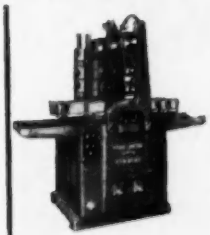
Speed and Accuracy!

More and more—Kent-Owens Machines get the call for countless milling jobs today—because they're *rugged . . . simple . . . versatile.* Twin-post head mounting assures balanced load. Greater cutting efficiency—only two gear contacts, motor to cutter. Write for bulletins on wide range of hydraulic and hand-operated machines. Also, let our engineers help you with tooling and special machine requirements. Kent-Owens Machine Co., Toledo, Ohio.

No. 2-20
20" table travel . . . 42" x 12" table . . . full automatic hydraulic table feed.



No. 2-20V
20" table travel... vertical spindle with speed range 32 to 1284 R.P.M. . . . 42" x 12" table.



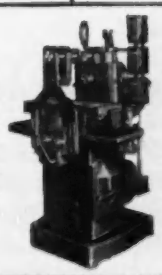
No. 2-20DS
Double Spindle for two milling operations at same time . . . 20" table travel . . . 42" x 12" table.

No. 1-14DS
Double Spindle for two milling operations at same time . . . 14" table travel . . . 32" x 9" table.

No. 1-M
Hand feed to table and head . . . 25" x 9" table . . . Adjustable head counter-balance.

No. 1-V
Hydraulic vertical head feed . . . 5½" head travel . . . 25" x 9" table.

No. 1-8
8" table travel . . . 25" x 9" table . . . automatic hydraulic table feed.



No. 1-14
32" x 9" table . . . 14" table travel . . . hydraulic table feed . . . full automatic cycle.

Call on KENT-OWENS for milling machines

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Continental has sparked aviation progress down through the years. Today, its outstanding family of gas turbines bids fair to rival even Continental's most noteworthy contribution of the past—the introduction of the A-40 engine which launched private flying on its era of greatest growth. . . . Opening of the second half-century of flight finds the broad engineering and production experience of the 52-year-old Continental family focused on turbines. Augmenting this is the specialized knowledge of a steadily-growing staff of leading technicians in this field. . . . Manufacture is already under way. Your requirements—conventional or otherwise—for shaft turbines, air generators or turbo-jets—can be met by C.A.E.

Engineers and others desiring careers in the field of small turbines are invited to write, giving background and type of work desired.

CONTINENTAL AVIATION & ENGINEERING CORPORATION
1500 ALGONQUIN AVE., DETROIT 14, MICHIGAN

strengths, such as the relatively favorable intentions to invest and build, probably contingent in large degree on continued good performance in other areas, such as consumption expenditures, where knowledge is meager. Those who stress the uncertainties warn that there is an element of risk in broadcasting that continued good times are ahead when perhaps they are not, in the sense that if the forecasted prosperity is not actually forthcoming, confidence may be so affected as to aggravate any difficulties that do arise.

BOOKS...

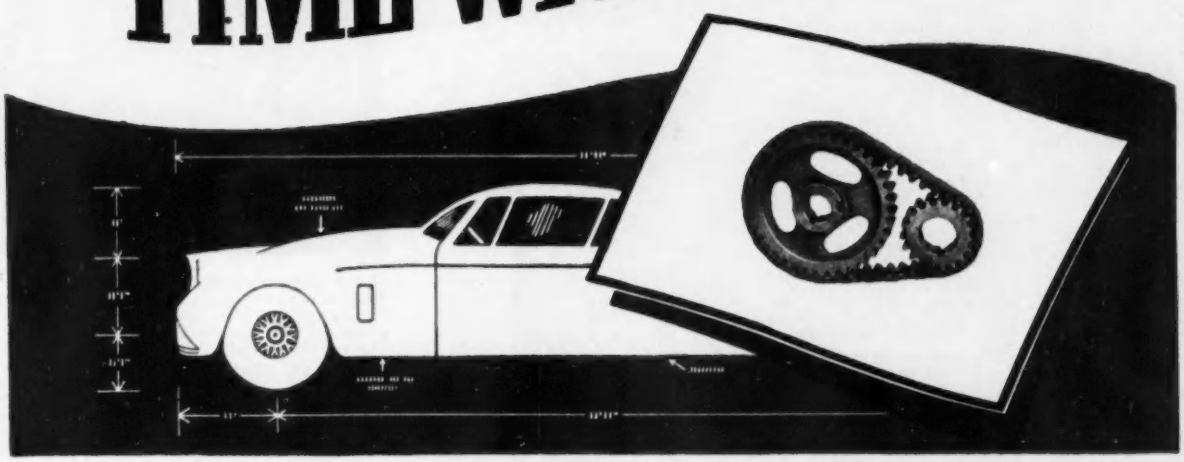
INTERNATIONAL TRADE STATISTICS, *edited by R.G.D. Allen and J. Edward Ely, published by John Wiley & Sons, Inc., 440 Fourth Ave., New York 16, N. Y. Price, $7.50.* The changing character of international trade in the postwar period has emphasized the importance of international trade statistics. The increasing use of such statistics has demonstrated the shortcomings of the raw material on which they are based. This volume provides a more adequate appraisal of the statistics of the world's trading countries than any previously available. Its objective is to clear the way for a more effective use of statistics in international trade.

THE ECONOMICS OF THE GUARANTEED ANNUAL WAGE, *published by Chamber of Commerce of the U. S., Washington 6, D. C. Price, $0.50.* Several major labor unions have announced the guaranteed wage as a next major objective. In some instances, demand is made for the integration of guaranteed unemployment compensation and the private guaranteed wage. This report analyzes the nature of the job security problem, the possible impact of broadly expanded private wage guarantees, and sets forth a number of conclusions.

PROCEEDINGS OF THE NINTH ANNUAL MEETING OF THE METAL POWDER ASSOCIATION, *published by the Metal Powder Association, 420 Lexington Ave., New York 17, N. Y. Price, $2.50.* Proceedings of this meeting of MPA, which took place in Cleveland, O., on April 21 and 22, 1953, have just been published. In the form of a 111-page leatherette bound booklet, the proceedings include all papers, illustrations and discussion of the papers presented at the meeting and provide a concise and up-to-the-minute commentary on the latest developments in powder metallurgy.

STORAGE BATTERY TECHNICAL SERVICE MANUAL, *published by Association of American Battery Manufacturers, 2706 First National Tower, Akron, O. Price, $0.50.* This booklet covers in non-technical language how a battery is constructed, how it works, how to maintain battery stock, how to install and service automotive batteries, and how to make certain battery repairs. A section is devoted to car generator systems, which must operate properly for longest battery life. Definition of often-used electrical terms and a complete index are also included.

More and more new models now TIME with CHAIN

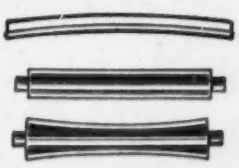


and LINK-BELT Timing Chain gives you

Automatic joint snugness **Smoother operation** **Longer life**

FOR greater design flexibility plus superior performance, leading automotive manufacturers are swinging to timing chain. Let our engineers show you how this outstanding chain can fit into your latest engine. Engineering and specification details are available in Book 2065.

Segmental bushings provide automatic joint snugness


Segmental bushings are made with slight bow.
After initial assembly in chain, bushings are straight.
Bow in bushing acts to keep a snug joint.

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TIMING CHAIN and SPROCKETS

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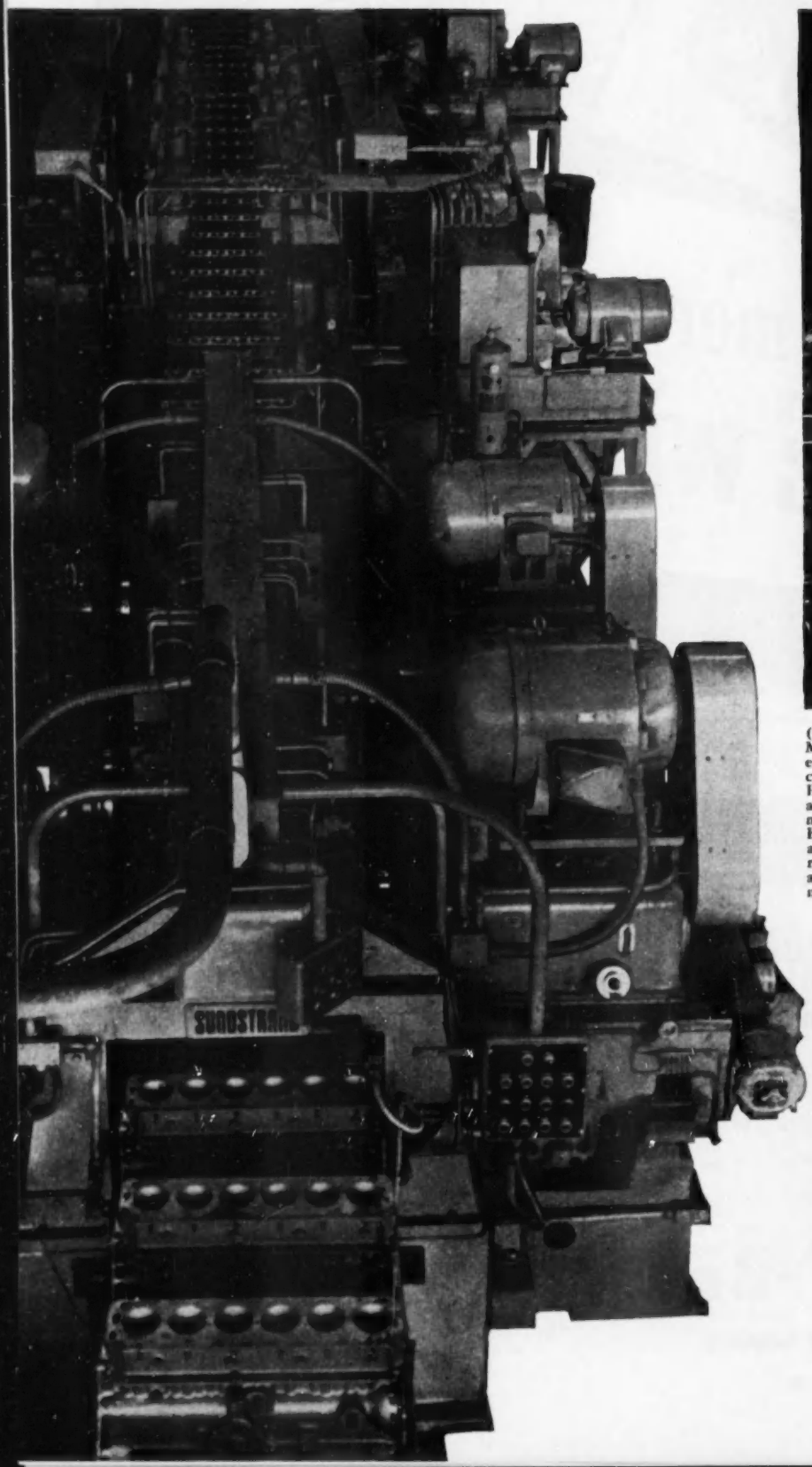
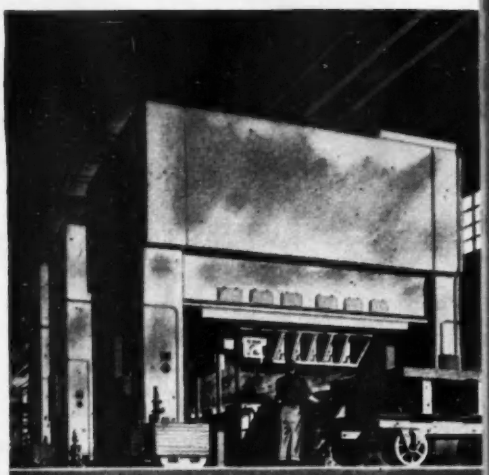
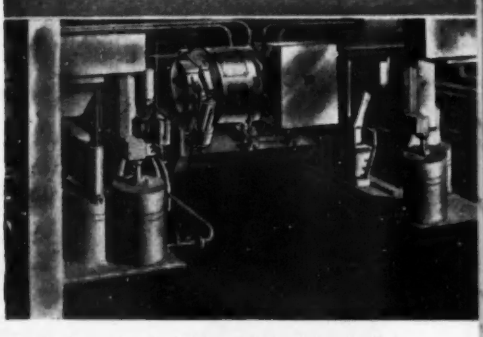
RELIANCE SPEEDS







(Left) Over 2000 Reliance "Precision-Built" Motors deliver steady, unfailing power to speed engine castings automatically through 26 machine operations at the Ford Cleveland Engine Plant. (Above) Adjustable speeds by the Reliance V★S System maintain record output from mammoth triple-action body presses at Ford's Buffalo Stamping Plant. Flywheel and clutch are eliminated. Starting, stopping, inching and reversing are accomplished electrically. Scrap and rejects are lower . . . die and equipment maintenance is reduced.

Reliance V★S Drive on this uncoiler permits selection of the best speed for unwinding and feeding coils automatically throughout the range of strip lengths required by various jobs and the consumption rate of the blanking press.

PRODUCTION AT FORD!

Reliance application engineering works with Ford Motor Company to coordinate motors and drives for top production efficiency in world's foremost automatic plants

The Ford Stamping Plant at Buffalo set a world production record for triple-action presses . . . the Ford Engine Plant at Cleveland increased productivity more than 50% over best previous methods. Both these outstanding plants have attained top production efficiency using Reliance motors and engineered drives . . . a Ford-Reliance engineering team operation.

In the Stamping Plant, Reliance V★S Drives are the electrical heart for critical automatic operations . . . not only in the automation processes, but also in the many individual machines whose smooth, unfailing, precisely timed operation makes automation itself possible. The versatility and dependability of the Reliance V★S Drive and its skillful application by Reliance Application Engineers have made possible better, faster, lower-cost operation . . . including setting of a world's production record for triple-action presses.

In the Engine Plant, automation hustles castings through a chain of 26 completely automatic machines which broach or mill 20 surfaces, and bore, drill, ream, chamfer, tap and counterbore 146 holes . . . to tolerances of .0005 inches. Throughout the 1545-foot production line, over 2000 Reliance Precision-Built Motor applications provide power with the necessary degree of ruggedness and dependability.

Reliance Can Help You, Too! As the user or the builder of machinery, you may have a problem that can be solved by a specially engineered drive, or by one of the many rugged Reliance industrial-duty motors. Whichever your situation, Reliance is ready to help you. A call to your nearby Reliance Sales Office . . . or a letter to us direct . . . will place at your disposal almost half a century of Reliance specialized engineering experience in the application of electric drives.

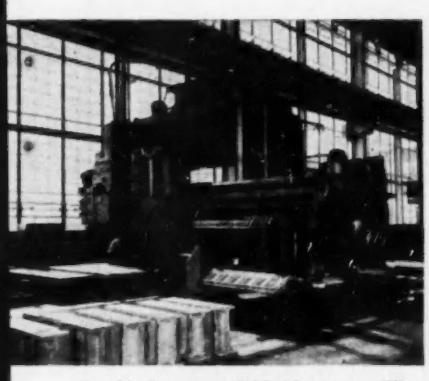
D-1473

Precision-Built MOTORS

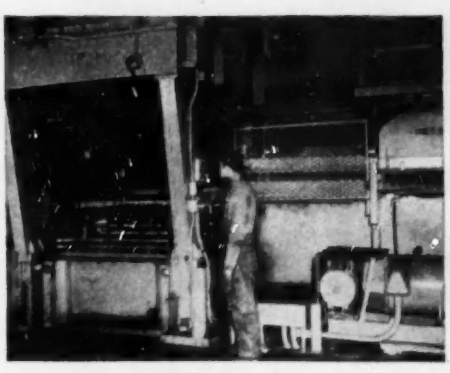
RELIANCE ELECTRIC AND ENGINEERING CO.

1123 Ivanhoe Road, Cleveland 10, Ohio • *Sales Representatives in Principal Cities*

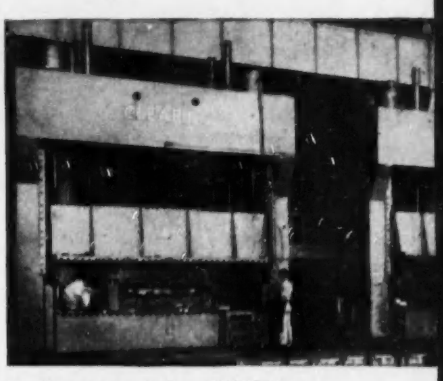
RELIANCE V★S DRIVE



On this large, special bridge-type milling machine, Reliance V★S Drive provides two spindle speeds and three directional feeds, all adjustable over 60:1 range, with dynamic braking and complete fingertip remote control. Additional features are reduced-voltage starting, motor field acceleration, motor field-loss and overload protection, armature reversing and pre-set speeds.



In this welding press line an automation conveyor removes parts from one operation to another on signal from limit switches actuated by the welding presses themselves. On this and similar lines, Reliance V★S Drives move 100-foot-long conveyors with one-ton loads, as much as 100 inches in 1½ seconds, and stop within limits of plus or minus ⅛".



On die spotters, Reliance V★S Drive provides fast speeds to minimize unproductive time on upstrokes and downstrokes. As dies approach, ram automatically decelerates to pre-set slowdown speed. When dies meet, V★S Drive automatically senses any excessive die-kiss pressure and positively stops ram before dies become cocked or damaged.

AIRBRIEFS

(*Continued from page 82*)

"The President of the United States, the Secretary of Defense and the Joint Chiefs of Staff are of one mind on that matter: this Nation will maintain a national Air Power superior to that of any other nation in the world."

More Titanium

The infant titanium industry has already created a Frankenstein monster in the aircraft industry, which says it will need 250,000 tons annually by 1960. Currently, the titanium industry is producing only about 2000 tons annually. This well-known fact has now been documented by specific examples: Curtiss-Wright Corp. says that it could reduce the weight of a jet engine by as much as 3000 lb by the use of titanium in place of existing steel and aluminum alloy components. (This statement, by C-W president Roy Hurley, obviously refers to future jet engines of much larger size than those currently in use, which weigh generally less than 3000 lb as is—Ed.) The Elastic Stop Nut Corp. reports results of a study on the use of titanium in its nut barrels which show that 150 lb of such fasteners alone could be saved. However, to make the switch, ESNA reveals that it would need 2100 tons of titanium annually to meet aircraft demand.

BIG . . .
SMALL . . .
CLEAR . . .
or COLORED
IF IT'S AN AUTO LAMP TUNG-SOL MAKES IT!
TUNG-SOL®
AUTO LAMPS
AND SIGNAL FLASHERS
TUNG-SOL makes All-Glass Sealed Beam Lamps, Miniature Lamps, Signal Flashers, Picture Tubes, Radio, TV and Special Purpose Electron Tubes and Semiconductor Products.
TUNG-SOL ELECTRIC INC., Newark 4, N. J., Sales Offices: Atlanta • Chicago • Columbus
Culver City (Los Angeles) • Dallas • Denver • Detroit • Newark • Philadelphia • Seattle

Engineer Starting Salaries

Latest statistics released by the Engineering Manpower Commission of the Engineers' Joint Council show that graduates of engineering colleges are enjoying starting salaries as high as $375 a month. Of 113 companies interviewed, eight per cent were offering a starting salary of $301-325 a month, 36 per cent were offering $326-3.0 per month and 44 per cent were offering $351-375 per month. That these salary brackets represented substantial increases over the previous year is seen in the fact that last year only six per cent of companies interviewed were offering $351-375 salaries for beginning engineers.

Vance Report at Last

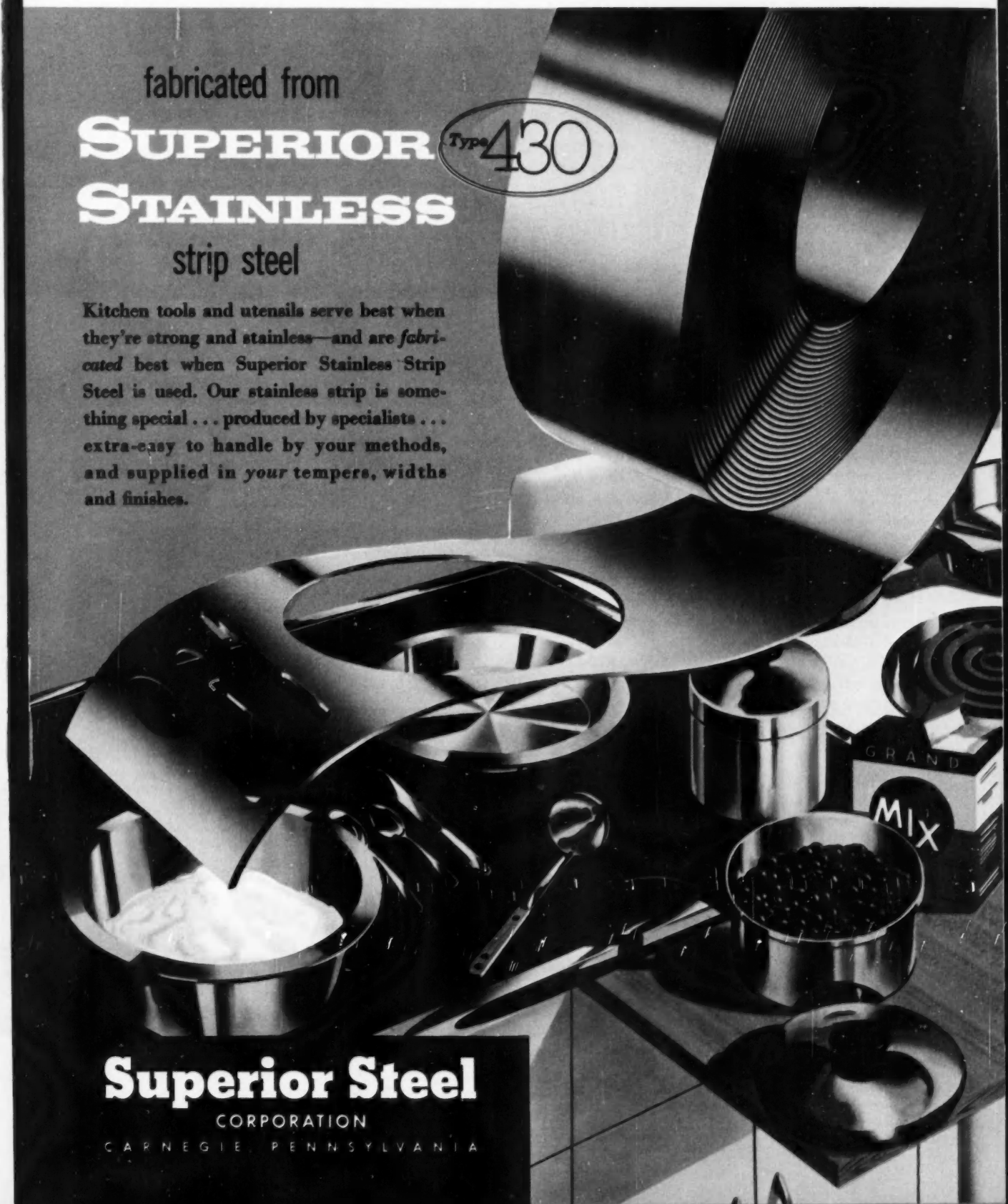
After gathering dust for more than a year, the so-called Vance Report is apparently going into effect in the Defense Department. Prepared by an Office of Defense Mobilization committee headed by Harold S. Vance, board chairman of Studebaker, the report calls for a multi-billion-dollar program of stand-by plants and tools. During the current fiscal year the Congress authorized $250 million for initial implementation of the program but none of the money has yet been spent. Now, however, Secretary of Defense Wilson says that every penny of the money will be obligated by the June 30 deadline and more money contained in the fiscal 1955 budget request.

Rapid Write-Offs Suspended

The Office of Defense Mobilization has ceased issuance of rapid tax write-off certificates covering new military aircraft, a move anticipated when the acceleration phase of combat aircraft production was completed. Indications that the Korean-war-sparked expansion program has about run its course is seen in the fact that ODM originally set up 237 expansion goals and, of this total, 120 have been met, 49 have been sus-

(*Turn to page 113, please*)

kitchen worksavers *with a built-in shine!*


fabricated from
SUPERIOR STAINLESS
Type 430
strip steel
Kitchen tools and utensils serve best when they're strong and stainless—and are *fabricated* best when Superior Stainless Strip Steel is used. Our stainless strip is something special . . . produced by specialists . . . extra-easy to handle by your methods, and supplied in *your* tempers, widths and finishes.
GRAND
MIX
Superior Steel
CORPORATION
CARNEGIE, PENNSYLVANIA

NEW PROTECTIVE COATING CHEMICAL FOR ALUMINUM

ALODIZING

Alodizing with "Alodine,"* a new technique in the protective coating of aluminum, was made available for production-scale use in 1946. Since that time Alodizing has largely supplanted the more elaborate, costly and time-consuming anodic treatments in the aircraft and other industries.

Continuous and successful industrial use has clearly demonstrated the simplicity and economy of the Alodizing process as well as the effectiveness of the "Alodine" amorphous coatings, particularly as a base for paint. In fact, the paint-bond that Alodized aluminum provides has been found to be superior to that possible with chromic acid anodizing.

The corrosion-resistance of unpainted aluminum Alodized with "Alodine" Nos. 100 or 300 is excellent, easily meeting the requirements of Specification MIL-C-5541. However, a need for protection of unpainted aluminum, even better than that obtained with chromic acid anodizing, has long been recognized.

NEW IMPROVED "ALODINE" DEVELOPED By ACP RESEARCH CHEMISTS

Several years of intensive research have now led to a new type of "Alodine," designated as "Alodine" No. 1200. This new protective coating chemical forms an amorphous mixed metallic oxide coating of low dielectric resistance that provides unusually high corrosion-resistance for unpainted aluminum. In addition, it forms an excellent paint bond that approaches closely the high quality obtained with the earlier types of "Alodine."

After having been tested for conformance with Specification MIL-C-5541, "Alodine" No. 1200 is now about to go into production.

PROCESS DETAILS

"Alodine" No. 1200 is the only essential chemical needed to prepare the coating bath and the final rinse bath. One of its unique features is that it can be used in tanks in an immersion process, or, in a multi-stage power washer in a spray process, or, with a slight adjustment of pH, with brush or portable spray equipment in a manual process. This means that even where the simple production equipment is not available, or where touching up of damaged coatings previously Alodized or anodized is required, excellent protection and paint bonding can still be obtained with practically no equipment.

All three methods of application easily meet the requirements of Specification MIL-C-5541.

Process sequence for all three methods of application is the same as for other standard grades of "Alodine" such as Nos. 100, 300, and 600, viz.: 1. Pre-cleaning. 2. Rinsing. 3. Alodizing. 4. Rinsing. 5. Acidulated rinsing. 6. Drying.

Coating time in an immersion process ranges from 2 to 8 minutes and in a mechanized spray process is about 30 seconds. "Alodine" No. 1200 baths are operated at room temperatures (70° to 100°F.) and heating is required only if the bath has gotten cold after a "down" period.

RECOMMENDED USES FOR "ALODINE" No. 1200

"Alodine" No. 1200 is specifically recommended for coating wrought products that are not to be painted or are to be only partially painted; and for coating casting and forging alloys whether or not these are to be painted. "Alodine" Nos. 100 and 300 are still recommended for coating wrought products such as venetian blind slats, awnings, etc., that are invariably painted.

RESULTS OF TENSILE TESTS

This new "Alodine" not only retards visible corrosion and pitting, but as shown in the table below, the loss of ductility with "Alodine" No. 1200, both brush and dip, after 1000 hours salt spray was less than for chromic acid anodizing after 250 hours, and for "Alodine" No. 100 and a conventional chromate treatment after 168 hours exposure

PROCESS	SALT SPRAY EXPOSURE	COMPLIANCE WITH TENSILE REQUIREMENTS OF MIL-C-5541
CHROMIC ACID ANODIZING	168 hrs.	passes
	250 hrs.	passes
	500 hrs.	fails
	1000 hrs.	fails
BRUSH "ALODINE" No. 1200	168 hrs.	passes
	250 hrs.	passes
	500 hrs.	passes
	1000 hrs.	passes
DIP "ALODINE" No. 1200	168 hrs.	passes
	250 hrs.	passes
	500 hrs.	passes
	1000 hrs.	passes
DIP "ALODINE" No. 100	168 hrs.	passes
	250 hrs.	fails
	500 hrs.	fails
	1000 hrs.	fails
CONVENTIONAL CHROMATE TREATMENT	168 hrs.	passes
	250 hrs.	fails
	500 hrs.	fails
	1000 hrs.	fails

*"Alodine" Trade Mark Reg. U. S. Pat. Off.

CHEMICALS ACP PROCESSES

AMERICAN CHEMICAL PAINT COMPANY

General Offices: Ambler, Penna.

Detroit, Michigan *Niles, California* *Windsor, Ontario*

AIRBRIEFS

(*Continued from page* 110)

pended for further review and only 68 are continuing eligible for certification. ODM has approved more than $1 billion in new military aircraft plant expansion programs for five-year tax amortization. Programs still eligible for rapid tax write-offs include alkylates, heavy aluminum aircraft forgings, tapered aluminum sheet, titanium metal, molybdenum, nickel tungsten ore, selenium and electronic equipment for military use.

United Aircraft Split

It is most unusual for a holding company to voluntarily award independent status to one of its subsidiaries but United Aircraft Corp. is doing just that with its Chance Vought Aircraft Division. Reason for the split, according to United president H. Mansfield Horner, is two-fold: existence of the airframe company alongside the Pratt & Whitney engine division caused potential engine customers to be cautious in providing details on their airplane for purposes of engine installation discussion and, similarly, it is believed that an independent Chance Vought Aircraft Corp. will have more competitive freedom in its negotiations with its military and commercial customers. The split will be accomplished gradually through stock offerings to present stockholders, followed by public offerings. United, however, plans to retain its Sikorsky Aircraft Division, as well as the Pratt & Whitney engine and Hamilton Standard Propeller divisions.

Backlog Continues High

Despite signs of a leveling-off of the aircraft manufacturing industry, its sales continue to keep pace with its deliveries. Total industry backlog in the third quarter of 1953 was $18,278,000,000. At the present rate this is about two years steady work. However, at year's end sales were averaging about $900 million a month, compared to deliveries of about $800 million a month.

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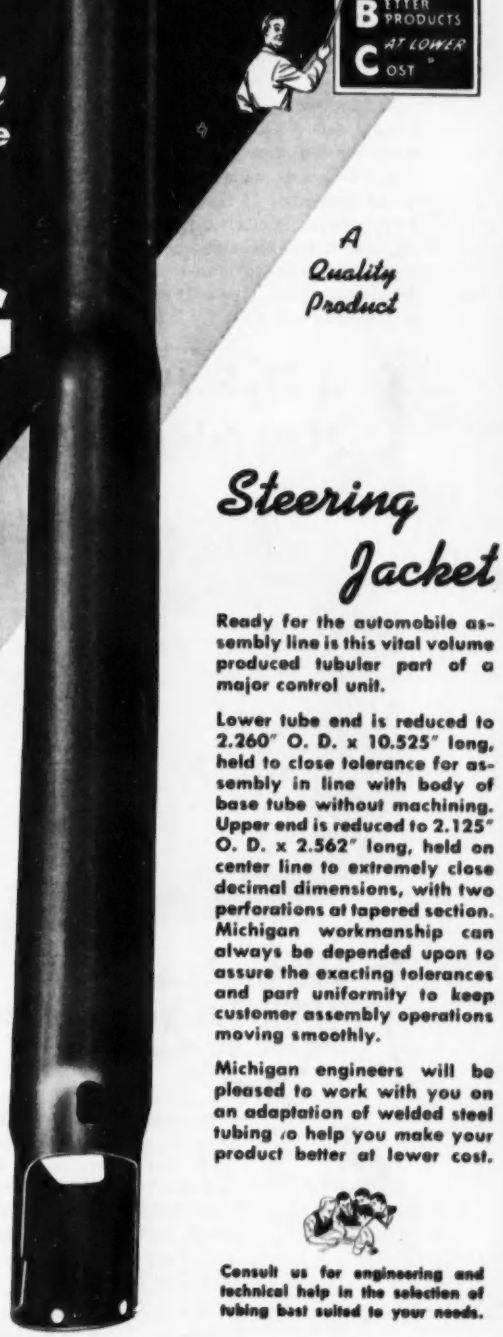
MANUFACTURING

the A-B-C of M-S-T

ALWAYS MAKES POSSIBLE
BETTER PRODUCTS
AT LOWER COST

Michigan
Electric Resistance
WELDED
STEEL
TUBING



A Quality Product

ROUND
⅜" to 4" O. D. 8 to 22 gauge
SQUARE-RECTANGULAR
½" to 2" O.D. 20 gauge
1" to 2¼", 14, 16, 18 gauge
Carbon 1010 to 1025

Michigan Tubing
has uniform strength, weight, ductility, I. D. and O. D., wall thickness, machinability, and weldability. It can be flanged, expanded, tapered, swaged, beaded, upset, flattened, forged, spun closed, fluted, and rolled. Available in a wide range of sizes, shapes and wall thicknesses, prefabricated by Michigan or formed and machined in your own plant.

Steering Jacket

Ready for the automobile assembly line is this vital volume produced tubular part of a major control unit.

Lower tube end is reduced to 2.260" O. D. x 10.525" long, held to close tolerance for assembly in line with body of base tube without machining. Upper end is reduced to 2.125" O. D. x 2.562" long, held on center line to extremely close decimal dimensions, with two perforations at tapered section. Michigan workmanship can always be depended upon to assure the exacting tolerances and part uniformity to keep customer assembly operations moving smoothly.

Michigan engineers will be pleased to work with you on an adaptation of welded steel tubing to help you make your product better at lower cost.

Consult us for engineering and technical help in the selection of tubing best suited to your needs.

Plus Fabricating of our own tubing Michigan is interested ONLY IN THE FABRICATION OF Stainless steel, copper, brass and aluminum tubing.

THE OLDEST NAME IN ELECTRIC RESISTANCE WELDED STEEL TUBING

Michigan STEEL TUBE PRODUCTS CO.

More than 35 Years in the Business
9450 BUFFALO STREET • DETROIT 12, MICHIGAN
FACTORIES: DETROIT, MICHIGAN—SHELBY, OHIO

DISTRIBUTORS: Steel Sales Corp., Chicago, St. Louis, Milwaukee, Indianapolis and Minneapolis—Miller Steel Co., Inc., Hillside, N. J.—C. L. Hyland Co., Dayton, Ohio—Service Steel Co., Los Angeles, Calif.—Strong, Carlisle & Hammond Co., Cleveland, Ohio—Globe Supply Co., Denver, Colorado—W. A. McMichaels Co., Upper Darby, Pa.—A. J. Fitzgibbons Co., Buffalo, N. Y.—Henry E. Clark & Co., Houston Texas.

New Defense Facilities

SUPPLEMENTING the list of Certificates of Necessity issued up to November 18 (incorrectly given as Nov. 30), 1953, authorizing new or expanded defense plant facilities for the manufacture of automotive and aviation war goods which were published in the December 15 issue, page 129, of AUTOMOTIVE INDUSTRIES, the following additional certificates were announced by the Defense Production Administration, November 19, 1953, to December 2, 1953.

Included in this latest tabulation, 18,511 new or expanded defense facilities of all types have been authorized for rapid tax write-offs, the total amount eligible for amortization being $28,874,119,000. These figures are exclusive of cases that are up for later review but included in this list —in these cases, no dollar amount is listed. The figure appearing in parentheses is the percentage authorized in respect to actual fast tax write-offs.

—A—

Allegheny Ludlum Steel Corp., West Leechburg, Pa.
Grain-oriented steel sheet—$3,630,000 (50)

American Machine and Foundry Co., Buffalo, New York
Ordnance—$29,929 (65)

—B—

Boeing Airplane Company, Seattle, Wash.
Aircraft parts—$225,950 (60)

—D—

Detroit Gauge & Tool Company, Detroit, Mich.
Tools & dies—$42,655 (70)

—I—

Industrial Tool & Machine Co., Inc., Smithfield, R. I.
Ordnance—$38,984 (70)

—K—

The K F & D Manufacturing Co., Manchester, Conn.
Gages & aircraft parts—$32,352 (70)

—L—

Lansdale Ordnance Co., Lansdale, Pa.
Ordnance—$30,000 (45)

Lear, Incorporated, Learcal Div., Los Angeles, Calif.
Scientific instruments for military use—$34,909 (65)

Lockheed Aircraft Corp., Burbank, Calif.
Aircraft—$105,281 (65)

—S—

Stromberg-Carlson Company, Rochester, New York
Electronic products—$94,385 (40)

Sutton Tool Company, Sturgis, Michigan
Machine tool attachments—$68,900 (65)

—U—

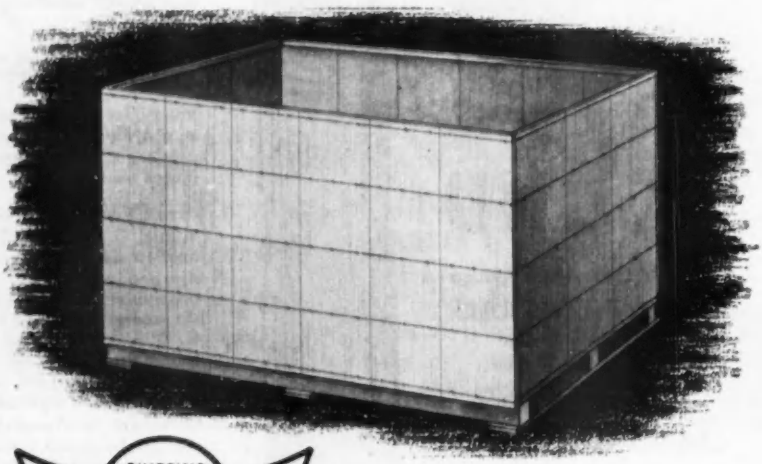
United States Steel Corp., Chicago, Illinois
Wide flange structural shapes—$1,430,000 (65), $6,570,000 (50)

United States Steel Corp., Munhall, Pa.
Heavy steel plate—$5,430,000 (50)

—W—

Winchester Repeating Arms Co., Div. Olin Industries, Inc., New Haven, Conn.
Ordnance—$44,511 (65)

A Multi-Purpose Box That Answers Materials Handling Problems...

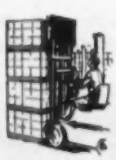


SHIPPING SUPERSTRONG CONTAINERS — REG. U.S. PAT. OFF.

WIREBOUND PALLET BOX

The versatility of wirebound containers is well exemplified in the SUPERSTRONG Wirebound Pallet Box. You can use it on the production line...for interplant transportation of parts...as a storage bin... as a shipping container which may be easily knocked down and returned for reuse.

SUPERSTRONG Wirebound Pallet Boxes are light in weight, sturdily constructed—and offer an economical answer to materials handling cost problems. They are engineer designed and built to your individual requirements. We would appreciate an opportunity to study your problems and offer our suggestions.



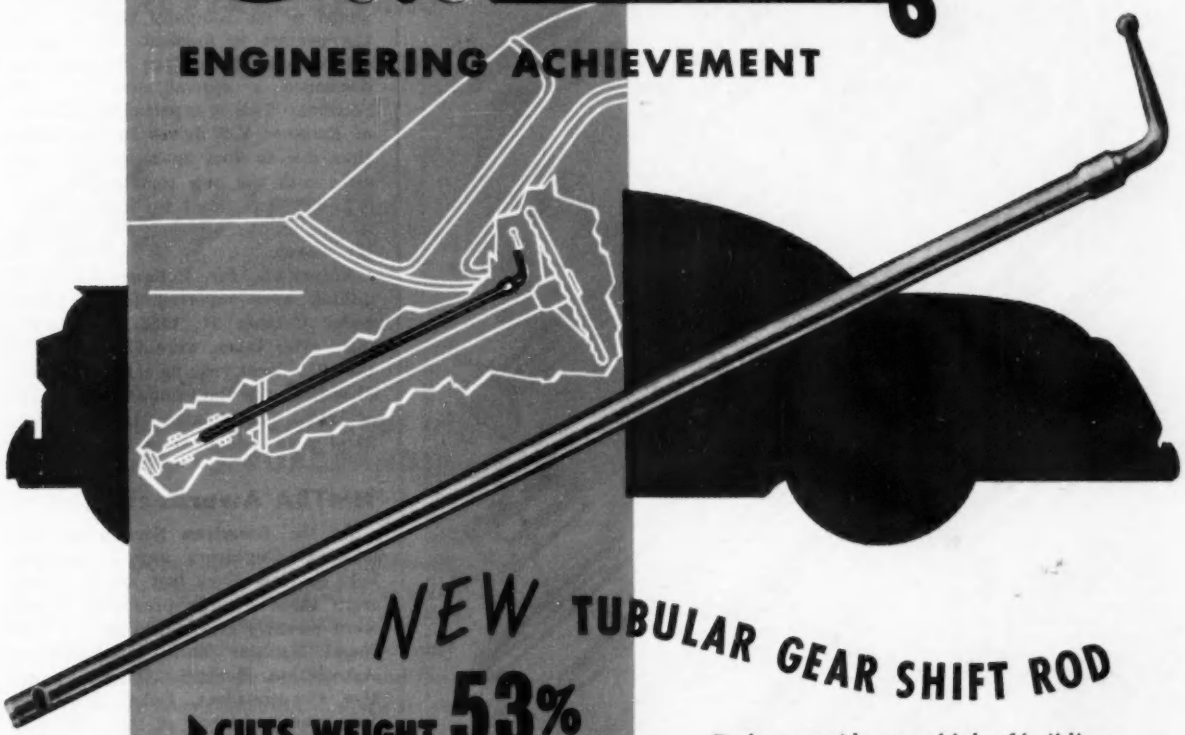
RATHBORNE, HAIR and RIDGWAY BOX CO.
1440 WEST 21st PLACE • CHICAGO 8, ILLINOIS

Another ROCHESTER PRODUCTS

STEEL

GM tubing

ENGINEERING ACHIEVEMENT



NEW TUBULAR GEAR SHIFT ROD

▶ CUTS WEIGHT 53%
...Yet Meets All Durability Requirements

▶ LOWERS COSTS

Perhaps you'd never think of building a gear shift rod from *tubing* . . . but Rochester Products did. The result is an ingeniously designed, soundly engineered GM Steel Tubing rod that will stand up under all conditions—yet weighs *less than half* as much as ordinary rods. Best of all, it COSTS LESS!

Here is one more example of how Rochester Products engineers are combining ideas, skill, experience and GM Steel Tubing to help hundreds of industries build *better products* for *less money.* We can help *you,* too!

SEND FOR *FREE* BROCHURE

Entitled *"Better Products for Greater Progress . . . ,"* This new, illustrated, fast-packed brochure tells how GM Steel Tubing can help solve design, production and cost problems. Send for your free copy today. Request Brochure No. 1120.

ROCHESTER PRODUCTS *DIVISION OF GENERAL MOTORS*

ROCHESTER, N. Y., U. S. A.

ALSO MANUFACTURERS OF ROCHESTER CARBURETORS AND ROCHESTER CIGAR LIGHTERS

RP STEEL TUBING

"CHICAGO"
precision valve gear parts

●STEEL ●CAST IRON ●STEEL and IRON

Hydraulic Tappets • Hydraulic Units for Push Rods and Rocker Arms • Mechanical Tappets • Push Rods • Self Locking and Standard Thread Adjusting Screws • Adjusting Screw and Pad Assemblies • Valve Spring Retainers • Split Valve Locks

Connecting Rod Bolts.....Hydraulic Cylinder Pistons
Cylinder Head Studs.....Cylinder Head Cap Screws
Main Bearing Studs.....Main Bearing Cap Screws
Flywheel to Crankshaft Screws.....Diesel Energy Cells
Wheel Bolts and Studs.....Differential Carrier Screws
Oil Pump to Distributor Shafts.....Rocker Arm Shafts
Automatic Transmission Valves.....Water Pump Shafts
Roller Followers.....Ball Joint Assemblies

External and Internal Grinding, Thread Grinding, Precision Roll Threading

Heat Treating • Carbon Restoration • Carburizing • Carbo Nitriding • Cyaniding • Hydrogen Brazing • Complete Metallurgical, Dynamometer and Testing Laboratories

Special Screw Machine Parts 1/16" to 5" Diameter • Cold Upset 3/16" to 1" Diameter • Cap Screws • Set Screws • Nuts • Studs • Taper Pins • Socket Screw Products

The CHICAGO SCREW COMPANY
2801 WASHINGTON BLVD.
BELLWOOD, ILLINOIS
Established 1872

News of the MACHINERY INDUSTRIES

(*Continued from page* 63)

the influx of new business during recent months has been so satisfactory that the company's backlog has remained at $15 million since mid-year. He also reported that Reliance would shortly commence the addition of 90,000 sq ft of floor space at its Ashtabula division. This means that approximately 400 employes will be added to the company payroll when the project is finished. Mr. Corey also announced that the company has developed a special mercury tube rectifier. This is expected to aid sales of Reliance V-S drives in the larger sizes due to floor space savings possible with the new rectifier.

Long term trend for the industry is still on the upswing according to Mr. Corey.

Shipments for Reliance of $36.8 million were reported for the year ended October 31, 1953. Net earnings, after taxes, were $1,832,976 for the 1953 fiscal year as compared with $1,816,140 for the comparative period of 1952. Total Federal taxes for the fiscal year amounted to $3,640,000.

NMTBA Awards

At the American Society of Mechanical Engineers annual meeting held in New York last month, there were three awards presented which were recently established by the National Machine Tool Manufacturers Association. Herbert L. Tigges, executive vice-president, Baker Brothers, Inc., and president of the NMTBA, presented the machine tool design and economic value awards, respectively to Ernest Wildhaber, mechanical engineer, Gleason Works, for his paper, "Manufacture and Application of Gleason Toothed Face Couplings and Clutches"; Robert R. Slaymaker, professor, Case School of Applied Sciences, and consultant for the Cleveland Graphite Bronze Co., for his paper, "Bearing Design Using Concentric Journal Theory"; and to Carroll R. Alden, research engineer, Ex-Cell-O Corp., for his paper, "Electrospark Machining."

AUTOMOTIVE INDUSTRIES . . .
***Is your News Magazine of Automotive and Aviation* MANUFACTURING**

One lever controls

8 FORWARD SPEEDS

TWO REVERSE SPEEDS

NO GEAR-SPLITTING!

New MODEL R-45 ROADRANGER®

Now 125-160 hp rigs can have the advantages of the new R-45 ROADRANGER Transmission

The famous one-stick Fuller ROADRANGER is now available for rigs powered by engines delivering up to 385 pounds-feet of torque.

With the new R-45, gear-splitting is entirely *eliminated*. Shifts are simple, short, and fast, with only one power shift in the whole series. Yet you have 8 forward speeds—available in *equal*, progressive, selective steps, none exceeding 38%—to keep your engine *always* turning in its most efficient range.

With this transmission, there's no more engine lugging, no more low rpm between shifts. With the Fuller ROADRANGER, you can haul more, and maintain higher average speeds than ever before—with so much better utilization of horsepower that you make 1/3 fewer shifts. Write today for full information on the new Fuller R-45 ROADRANGER.

Check These Advantages:

- Easier, quicker shifts—38% steps—one shift lever controls all 8 forward speeds
- No gear-splitting—8 selective gear ratios, evenly and progressively spaced
- Higher average road speeds—engine operates in peak hp range with greater fuel economy
- Less driver fatigue—⅓ less shifting
- Range shifts pre-selected—automatic and synchronized
- More compact than other 8-speed transmissions
- More cargo can be carried on the payload axle.

VITAL STATISTICS

GEAR RATIOS:

Low Range		High Range	
1st	9.78	5th	2.66
2nd	6.98	6th	1.90
3rd	4.99	7th	1.36
4th	3.68	8th	1.00
Reverse	11.01	Reverse	2.99

Installation Length . . . . . 29⅝"
Clutch Housing Sizes . . . . . SAE 1, 2, 3
Weight, with Standard Controls . 457 lbs.

Fuller TRANSMISSIONS

FULLER MANUFACTURING COMPANY (Transmission Division), KALAMAZOO 13F, MICHIGAN

Unit Drop Forge Division, Milwaukee 1, Wis. • WESTERN DISTRICT OFFICE (SALES & SERVICE—BOTH DIVISIONS), 641 E. 10th Street, Oakland 6, Calif.

More Defense Contract Awards

THIS latest list of defense prime contracts that have been awarded covers the period from November 2, 1953, to December 22, 1953. Items included in this list are for various types of automotive military equipment, including tanks, motorized gun carriages, trucks, airplanes, automotive components and spare parts, automotive maintenance equipment, etc.

—A—

Allis-Chalmers Manufacturing Co., Milwaukee, Wis.
Spare parts—Various—$25,744
Spare parts—Various—$81,181

Austin-Western Company, Aurora, Illinois
Spare parts—Various—$33,353

Automatic Transportation Co., Div. Yale & Towne Mfg. Co., Chicago, Ill.
Fork trucks—10—$34,560

Manufacturers of...
HARDENED and GROUND PARTS
for over 40 years

SINCE the day of the duster and goggles, The Brown Corp. has meant highest quality precision parts for the automotive industry. Today, Brown Parts serve trucks, tractors, trailers, buses, axle builders, off-the-road machines and Diesel locomotives. The production methods and facilities we have developed are unexcelled — uniform product quality is assured—deliveries are reliable—service is efficient. Ask any of our long list of satisfied customers throughout the industry.

For further information about our specialized production of hardened and ground automotive and industrial parts, just drop us a note. We invite an opportunity to quote on your work.

Henry W. Brown
PRESIDENT

Parts include . . .
King Pins
Shackle Bolts
Shackle Pins
Brake Anchor Bolts
Countershafts
Idler Shafts
Stub Axle Shafts
Steering Ball Bolts
Beam Bolts and Bolts
5th-Wheel Rocker Shafts
Wheel Studs
Water Pump Shafts
. . . anything in the hardened and ground line, of any analysis steel, up to 4 1/4" diameter.

THE BROWN CORP.
213 BELLEVUE AVE. SYRACUSE, N. Y.
C. H. Ehlert, 3407 Clarendon Rd., Cleveland • N. F. Spring, 4716 Balfour Rd., Detroit • R. C. Sanderson, 5609 N. Clark St., Chicago • Harry J. Windmiller, 1704 Carlton, Fort Worth • Johns William & Co., 1440 N. Spring St., Los Angeles, Calif. • John B. Hunt, 5611 S.E. Yamhill St., Portland, Ore.

—B—

Bayard Electronics Company, Philadelphia, Pa.
Motor vehicle parts 54-101—6230—$82,236

Bendix Aviation Corp., Bendix Products Div., S. Bend, Indiana
Wheel—9—$26,400
Brake—9
Brake PR 395195 Q—12

Bendix Aviation Corp., Scintilla Magneto Div., Sidney, New York
Parts for engines—Various—$205,585

The Buda Company, Harvey, Illinois
Spare parts—Various—$43,992

—C—

Caterpillar Tractor Company, Peoria, Illinois
Tractors and spare parts—$377,047

Cessna Aircraft Co., Wichita, Kansas
Aircraft trainer—3—$1,125,000

Chevrolet Central Office, Detroit, Mich.
Motor vehicle parts—1000—$108,570

Chrysler Corp., Detroit, Michigan
General Purpose wheeled personnel and cargo vehicle, concept studies and design investigations — Job — $31,805
Redesign T48 Tank—Job—$5,039,800
Trucks, 3/4 t, 4 x 4 N37 series—230—$1,433,391

Clark Equipment Company, Washington, D. C.
Fork trucks electric—21—$85,701

Cummins Engine Company, Inc., Columbus, Indiana
Spare parts—Various—$673,292

—D—

Diamond T Motor Car Company, Chicago, Illinois
Commercial vehicles—8—$110,755

—E—

Electric Auto Lite Company, Toledo, Ohio
Spare parts—Various—$32,745
Parts—2750—$53,211

—F—

Fargo Motor Corp., Washington, D. C.
Trucks van bodies—10 ea—$30,083

Food Machinery & Chemical Corp., Ordnance Div., San Jose, Calif.
Repair parts for landing vehicle tracks—130,174—$3,382,392

—G—

Gear Grinding Machine Company, Detroit, Michigan
Motor vehicle parts—3350—$82,761

General Motors Corp., Cleveland Diesel Div., Cleveland, Ohio
Repair parts—3725—$52,520

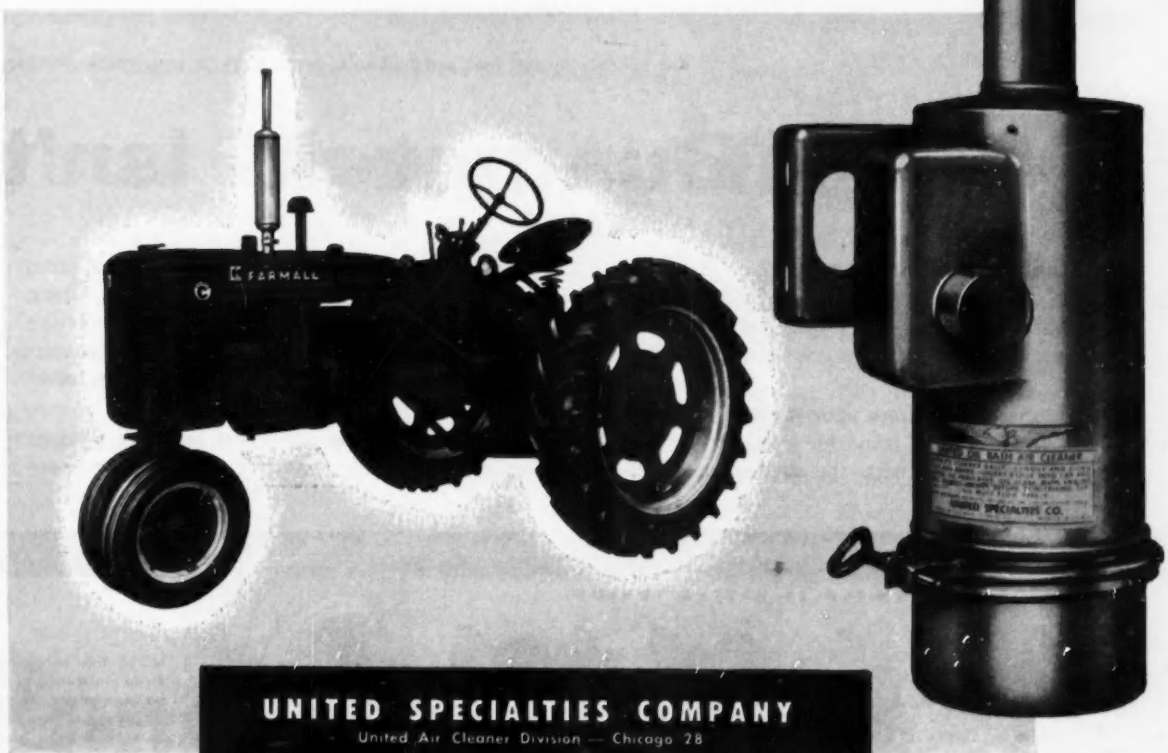
(*Turn to page* 122, *please*)

EXTRA ACRES OF ENGINE LIFE

United Specialties Oil Bath Air Cleaner protects International Harvester's Farmall Super C tractor engine against harmful dust and abrasives . . . provides clean engine air that means longer life for rings, pistons, bearings.

Turbulent, splash action of oil in United cleaners washes air so thoroughly it is almost 100 percent dust-free when it enters the engine. That is why millions of United oil bath air cleaners are protecting internal combustion engines in practically every field of operation — including automobile, truck, tractor, construction equipment, stationary and portable power units.

In considering your particular air cleaner requirements, take advantage of United Specialties' engineering experience and research facilities. We are happy to be of assistance.



UNITED SPECIALTIES COMPANY

United Air Cleaner Division — Chicago 28
Mitchell Division — Philadelphia 36
Birmingham 11, Alabama

AIR CLEANERS • METAL STAMPINGS • ROLLED SHAPES
IGNITION AND TURN SIGNAL SWITCHES • DOVETAILS

For dependable oil, fuel and hydraulic brake lines in your trucks, trailers,

See if Bundyweld isn't

What do you need in your tubing?
Should it be leakproof, lightweight? Should it have high bursting point, high fatigue limit? Should it take almost every fabrication operation in the book?

What do you want from your tubing?
Want more peace of mind for yourself and everyone else connected with the production, sale, or servicing of your product? More peace of mind and satisfaction for your customers? Want tubing proved dependable in over 20 years of use in brake lines, fuel lines, hydraulic window lift lines, power-steering-connecting lines, instrument gauges, other applications?

Want your tubing in easily handled straight lengths—clean and ready for your production lines?

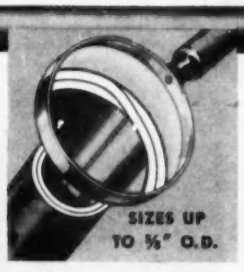
WHY BUNDYWELD IS BETTER TUBING

Bundyweld starts as a single strip of copper-coated steel. Then it's . . .

continuously rolled twice around laterally into a tube of uniform thickness,

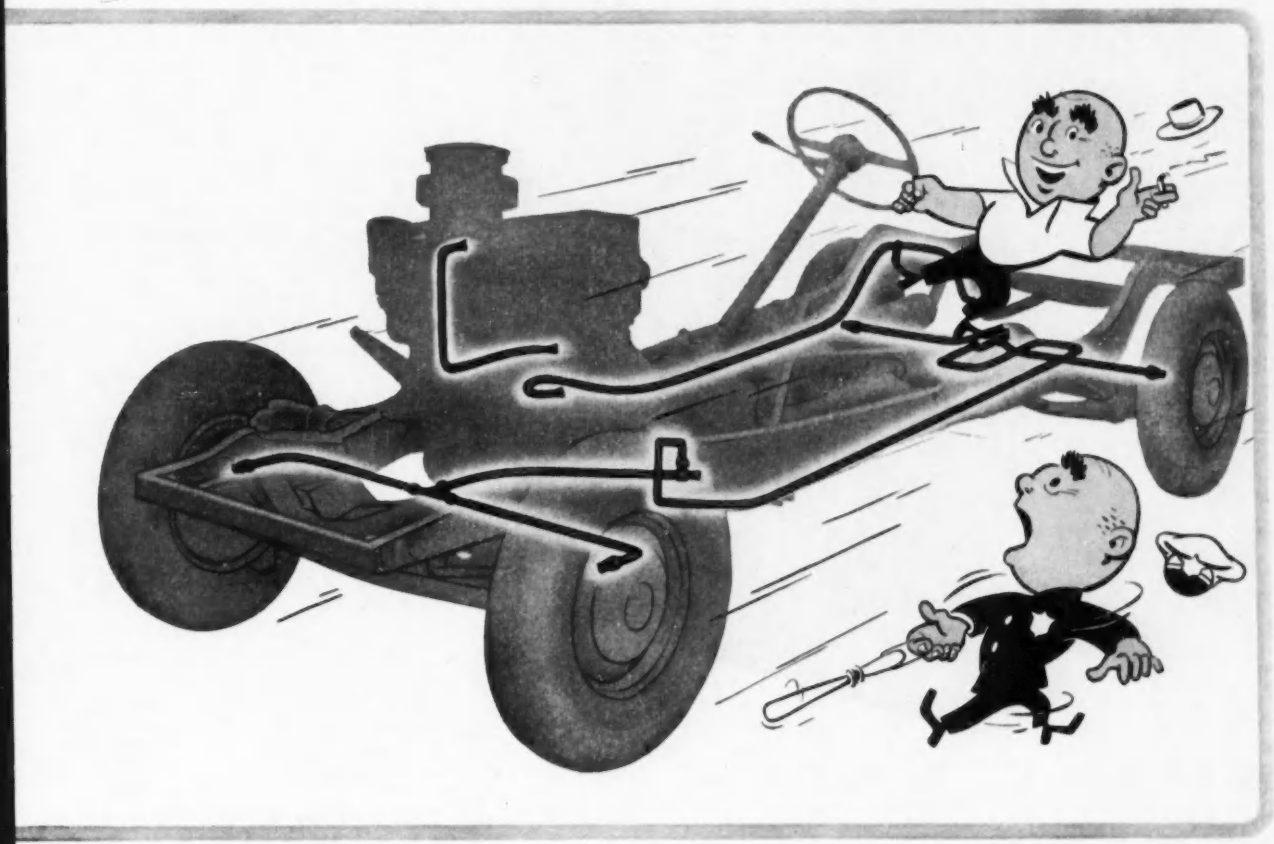
and passed through a furnace. Copper coating fuses with steel. Result . . .

Bundyweld, double-walled and brazed through 360° of wall contact.



← **NOTE** the exclusive Bundy-developed beveled edges, which afford a smoother joint, absence of bead and less chance for any leakage.

Bundy Tubing Distributors and Representatives: *Bridgeport, Conn.:* Karhumel Steel & Aluminum Co., 117 E. Washington St. • ***Cambridge 42, Mass.:*** Austin-Hastings Co., Inc., 226 Binney St. • ***Chattanooga 2, Tenn.:*** Peirson-Deakins Co., 823-824 Chattanooga Bank Bldg. • ***Chicago 32, Ill.:*** Lapham-Hickey Co., 3333 W. 47th Place • ***Elizabeth, New Jersey:*** A. B. Murray Co., Inc., Post Office Box 476 • ***Los Angeles 58, Calif.:*** Tubesales, 5400 Alcoa Ave. • ***Philadelphia 3, Penn.:*** Rutan & Co., 1717 Sansom St. • ***San Francisco 10, Calif.:*** Pacific Metals Co., Ltd., 3100 19th St. • ***Seattle 4, Wash.:*** Eagle Metals Co., 4755 First Ave., South • ***Toronto 5, Ontario, Canada:*** Alloy Metal Sales, Ltd., 181 Fleet St., East.
Bundyweld nickel and Monel tubing are sold by distributors of nickel and nickel alloys in principal cities.



tractors or automobiles—come to Bundy, headquarters for automotive tubing.

your kind of tubing

Or would you like it fabricated into the needed parts—exactly to your specifications? Want deliveries timed to exacting schedules and made as promised? Would you like to call in tubing specialists to work with you on design, fabrication, or function problems?

You'll find that Bundyweld Steel Tubing is your kind of tubing—the *only* tubing double-walled from a single strip, copper-bonded throughout 360° of double-wall contact. And you'll find that Bundy engineering and fabrication services are right to your liking, too. Call, wire or write us today for any details you'd like or for an appointment with a Bundy sales engineer for an exploratory talk.

BUNDY TUBING COMPANY
DETROIT 14, MICHIGAN

Bundyweld® Tubing

DOUBLE-WALLED FROM A SINGLE STRIP

PRATT & WHITNEY

TRI-ROLL

Thread Comparator

GAGE EXTERNAL THREADS

Faster Simply operate the hand lever . . . place work on rolls . . . release lever . . . read the indicator.

More Dependably Errors in leads, angle and pitch diameter are checked cumulatively in one setting. Errors in roundness and taper are read directly. Errors of angle or lead as well as minor diameter interference are also visually checked rapidly when required. Pressure control feature assures consistent accuracy.

At Lower Cost Rugged construction and flexible design provides accurate gaging on a wide range of thread sizes. Gaging rolls are rotatably mounted thus distributing wear evenly for maximum wear life.

USE THE COUPON ON THE FACING PAGE TO SEND FOR COMPLETE INFORMATION

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DIVISION NILES-BEMENT-POND COMPANY
WEST HARTFORD 1, CONNECTICUT, U. S. A.

First Choice for Accuracy

MACHINE TOOLS • CUTTING TOOLS • GAGES

(*Continued from page* 118)

—H—

Holley Carburetor Company, Detroit, Michigan
Fuel controls—Various—$2,075,271

The Frank C. Hough Company, Libertyville, Illinois
Tractor carrier plane towing, etc.—139—$640,623

Howe Fire Apparatus Company, Anderson, Indiana

—I—

International Harvester Company, Washington, D. C.
Trucks—5 ea—$16,250
Trucks—5 ea—$16,095

International Harvester Company, Chicago, Illinois
Crawler tractors—2 ea—$28,259

Dunbar Kapple, Inc., Geneva, Illinois
Tank automotive spare parts—$94,490

—K—

Kearney & Trecker Corp., Milwaukee, Wisconsin
Vertical automatic cycle milling machine Model 4CK, 25 hp—2—$83,620
Vertical milling machine—1

Kollsman Instrument Corp., Elmhurst, New York
Machine tools and other capital equipment—$785,577

—L—

La Crosse Trailer Corp., La Crosse, Wisconsin
Motor vehicles—15—$31,038
Motor vehicles—28—$58,023

Lear, Incorporated, Grand Rapids, Mich.
Components of F-5 Automatic Pilot System—$1,152,413

Liquid Carbonic Company, Chicago, Illinois
Mount-gun, T154—3—$29,541

—N—

Northrop Aircraft, Inc., Hawthorne, Calif.
Mobile trainer unit and components—$150,000

—O—

Outboard Marine & Mfg. Co., Johnson Motors Div., Waukegan, Ill.
Repair parts—8030—$29,707

—R—

Reo Motors, Inc., Lansing, Michigan
Kit, troop seats, tarp, bows and troop seat lazy backs—996—$208,-522
Motor vehicle parts—5660—$101,693

—S—

Sperry Gyroscope Company, Div. Sperry Corp., Great Neck, N. Y.
Motor & drive assy.—228—$815,567
Motor & drive assy.—473
Motor & drive assy.—228

— U —

United Aircraft Corp., Hamilton Standard Div., Windsor Locks, Conn.
Parts—Various—$38,690

United Aircraft Corp., Pratt & Whitney Aircraft Div., East Hartford, Conn.
Spare parts—Various—$43,823
Spare parts—Various—$2,607,044
Spare parts—Various—$84,629
Material for J48-P-8 engines—1000 ea—$91,950
Cylinder machine—511 ea—$122,568
Material for use on R4360-59 engines—Various—$95,080
Spare parts—Various—$242,234
Spare parts—Various—$575,110
Material for R4360-59 engines—Various—$68,367
Material for R4360-59 engines—Various—$2,100,388
Spare parts—Various—29,063
Spare parts—Various—187,531
Material for J57-P-1 engines—Various—$534,563
Material for J57-P-1 engines—Various $1,391,494

United States South Asia Corp., New York, N. Y.
Marine engines Diesel—8 ea—$130,800

— W —

Willys Motors, Inc., Toledo, Ohio
Trucks—3 ea—$13,265
Station wagons—13 ea—$35,532
Trucks—8 ea—$13,826
Jeeps—20 ea—$29,259

— Y —

The Yale & Towne Mfg. Co. Yale Materials Handling Div., Phila., Pa.
Lift hand truck electric—38—$37,810

BOOKS . . .

ROLLING WHEELS, *by Martin H. Bury, published by Dorrance & Co., Inc., Drexel Bldg., Fifth & Chestnut Sts., Philadelphia, Pa. Price, $3.50.* This is a book about automobiles and motoring as seen through the eyes of a successful automobile dealer. Although the volume is both factual and informative, it makes no attempt to be profound. Rather, it covers the lighter and more amusing incidents of the automobile from its earliest conception to the present—and with an occasional peek into the future. In the course of its 30 chapters, the book traces the origin and development of the penumatic tire, petroleum and its by-products, lacquers, paint, and many of the other things that have contributed to the modern automobile. Its deals in pertinent fashion with the subject of automobile financing and time payments. It also contains a listing of 2681 names of all known makes of cars ever to be registered for highway use in the U. S.

PRATT & WHITNEY
TRI-ROLL Thread Comparators

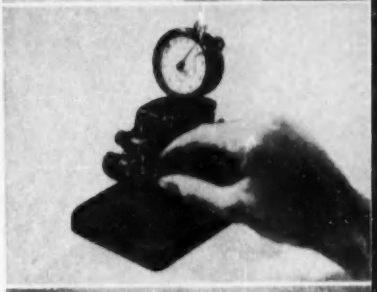
SOLVE *ANOTHER*
QUALITY CONTROL PROBLEM
Requiring:

A COMPLETE FUNCTIONAL THREAD CHECK

P&W Tri-Roll Thread Comparators, with full length gaging rolls meet this requirement in the Quality Control system of a large manufacturer of high quality screw thread fastenings. Errors in lead, angle and pitch diameter are read cumulatively on the dial; taper and out-of-round are also detected.

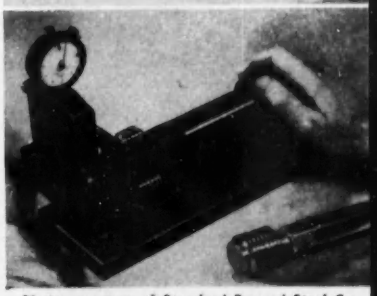
PLUS A CRITICAL PITCH DIAMETER CHECK

This is accomplished by using two-ribbed rolls truncated to ⅜ pitch crest flat and cleared root. Gaging operations are fast, simple and dependably accurate.



for a WIDE RANGE OF PRODUCT SIZES

Even this large, special screw thread is gaged rapidly, accurately and economically on a Tri-Roll Thread Comparator. Adaptation required only simple fixtures.



Photos courtesy of Standard Pressed Steel Co.

LET P&W HELP WITH YOUR QUALITY CONTROL PROBLEMS

Use the coupon below to send for Tri-Roll Gage Data Sheet No. 300-8A . . . or write on your Company letterhead outlining your gaging requirements.

First Choice P&W *for Accuracy*

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Please send my free copy of Gage Data Sheet No. 300-8A.

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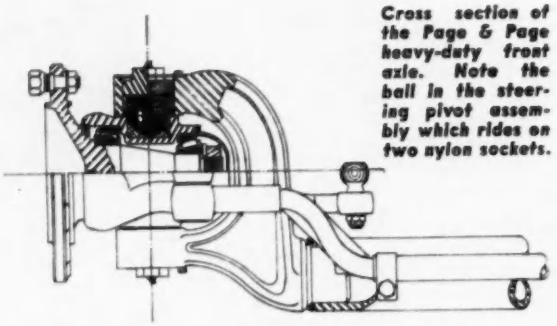
MACHINE TOOLS • CUTTING TOOLS • GAGES

Novel Front Axle for Trucks Has Rotating Wheel Spindles



Cross section of the Page & Page heavy-duty front axle. Note the ball in the steering pivot assembly which rides on two nylon sockets.

DETAILS of the Page & Page Co., Portland, Ore., heavy-duty front axle for trucks have just been released following the original brief announcement of the development in the August 1, 1953 issue of AUTOMOTIVE INDUSTRIES (page 38). Currently, the axle is being made in three series to suit axle requirement capacities from 4000 to 15,000 lb.

Basically, this "Gyroscopic" axle features center line steering—that is the center line of the wheel and tire assembly is over the center line of the yoke and hub which make up the steering pivot. This has been done by reversing the spindle and placing the wheel mounting flange on the outside of the spindle. Therefore, a feature of the axle is a rotating spindle with a stationary hub. Because of this design, Page & Page engineers assert that excellent steering control is obtained along with comparatively easy steering operation.

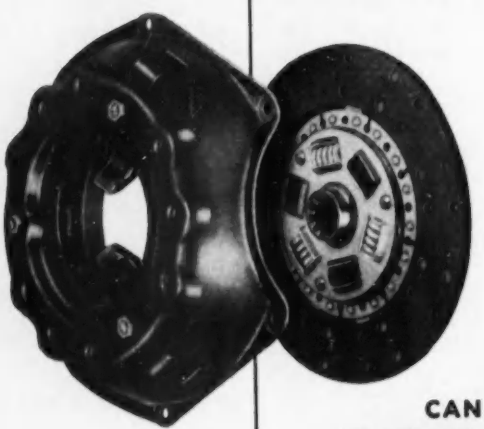
The steering pivot assembly is rather unique in that, as shown in the accompanying illustration of the cross section, it utilizes nylon sockets to carry the two hardened steel pivot balls. An adjusting screw plug is placed over and around the outside nylon socket to obtain proper clearance, take up wear, and, of course, to secure the top and bottom pivot assembly. An adjustment screw lock and a grease fitting are used in each adjusting screw to make up the rest of the assembly. Timken tapered roller bearings are used in the hub to carry the spindle.

Axles equipped with the nylon sockets have been adequately field tested by the company and it is said that the nylon did not show any sign of wear, abrasion, or deformation. Up to the present, Page & Page is machining the molded nlon part but it is believed that this operation can be eliminated when suitable molds are made.

Engineered by

BORG & BECK®

means . . . CLUTCHES built to the exacting standards which have made the name BORG & BECK famous for 36 years!



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BORG & BECK®

CLUTCHES . . . FOR THAT VITAL SPOT WHERE POWER TAKES HOLD OF THE LOAD

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BORG & BECK DIVISION
Borg-Warner Corporation
CHICAGO 38, ILLINOIS

AUTOMOTIVE INDUSTRIES . . .

is your News Magazine of Automotive and Aviation

MANUFACTURING

NEW COPPERPLY* WIRE CLOTH

of STEEL WIRE COPPER-COATED *Electrolytically*

● Seldom has there been developed a wire cloth so desirable and so usable, for so many needs, and for so many products.

It's the *new* Reynolds *Copperply*. Woven of steel-core wire, coated with copper *electrolytically* applied — its perfect concentric coating may be of any thickness desired.

"Handsome is" in appearance, with its richly red copper color. "Handsome does" in performance, with its strength of steel, combined with copper's advantages. Non-rusting and enduring...corrosion resistant... high in electrical conductivity . . . dissipates heat quickly. And *Copperply* may be readily welded, soldered, or brazed.

Name the weave, mesh, and wire size . . . the exact gauge of steel wire core, and thickness of copper you want—and you can have it—in *Copperply* wire cloth.

Rely on Reynolds over-50-years experience for technical help in your production and product development. Consultation without obligation, of course.

* Trade Mark, National Standard Company.

Reynolds WIRE CLOTH protects performance

NS NATIONAL-STANDARD Company NILES, MICHIGAN

REYNOLDS WIRE DIVISION, NATIONAL-STANDARD CO., **DIXON, ILLINOIS**

Divisions of National-Standard Co.

ATHENIA STEEL...*Clifton, N. J.* ..... Flat, High Carbon, Cold Rolled Spring Steel
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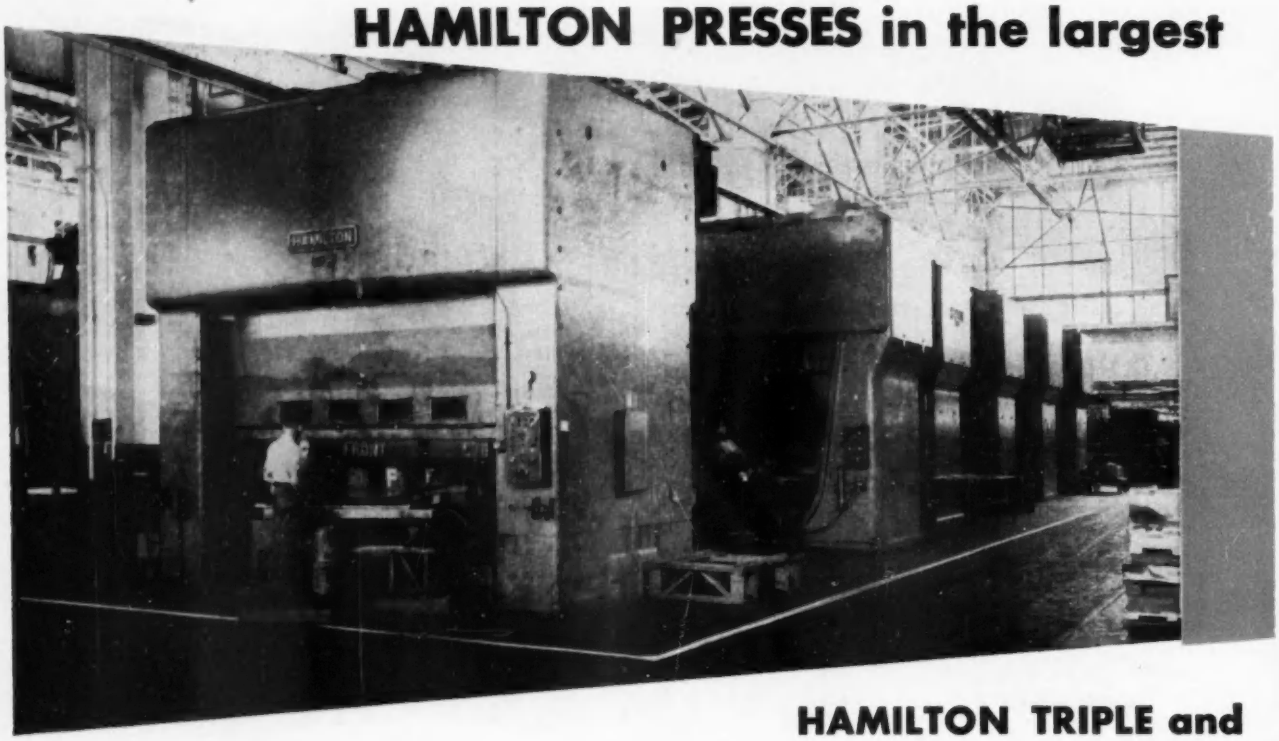
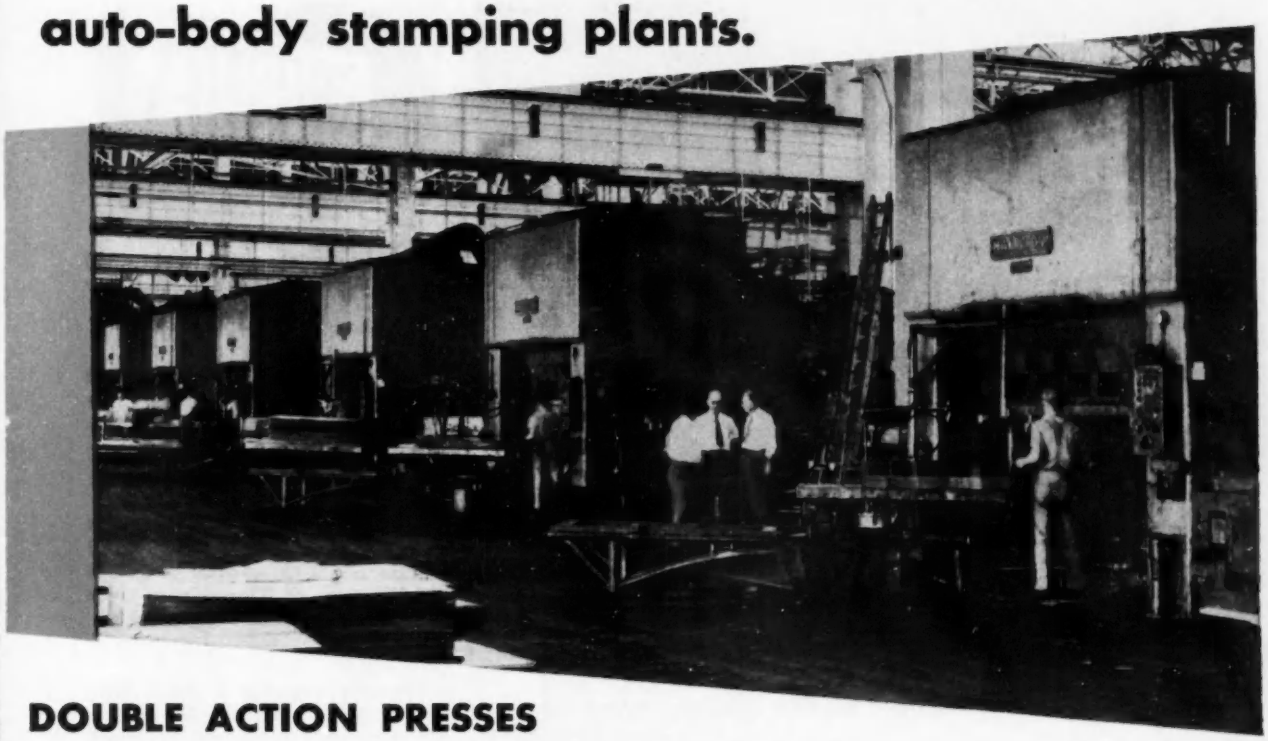


HAMILTON TRIPLE and head more than three-quarters

BALDWIN-LIMA

auto-body stamping plants.



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of the master production lines.

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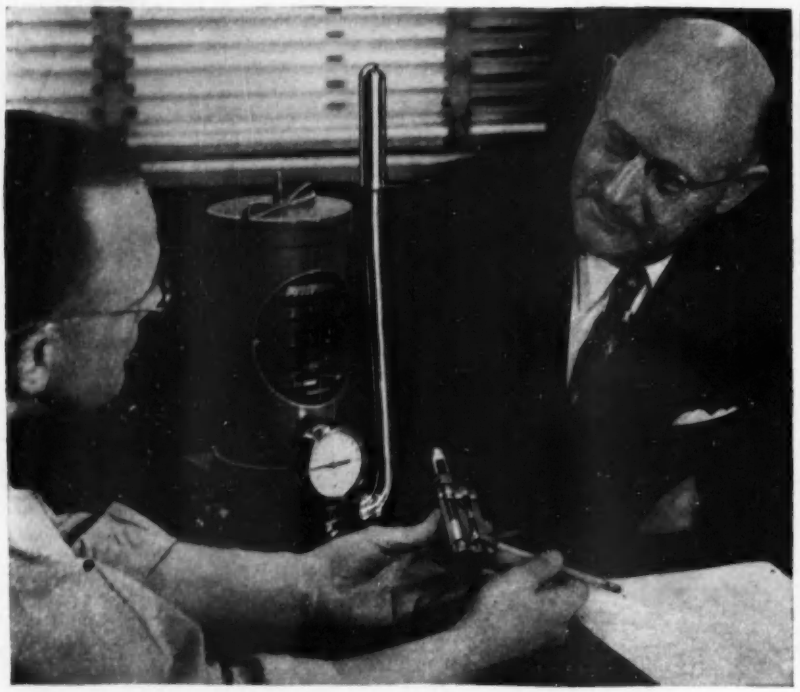

THE SUPERINTENDENT REPORTS TO THE GENERAL MANAGER

"Thanks to Farval, we're 375,938 hours ahead!"

IN a Detroit manufacturing plant, oiling machinery by hand took 11 men, or 27,456 man hours per year. In 1937 management installed 133 Farval systems to serve the 3100 bearings on its metal-forming presses.

Except for re-filling reservoirs, Farval completely eliminated the "human element" and over 15 years has saved the company 375,938 man hours—valued at $537,591 at prevailing labor rates.

In addition, the foreman reports not one shutdown for bearing replacement or repair due to faulty lubrication.

Farval is the Dualine system of centralized lubrication that hydraulically delivers oil or grease to each individual bearing, exactly measured, as often as desired. Today Farval systems protect millions of industrial bearings throughout the world.

FREE LUBRICATION SURVEY—Without obligation, let us send one of our expert lubrication engineers to inspect your plant equipment. He'll present recommendations in writing to show how Farval can save you money. Just mail coupon below or write us a note.

KEYS TO ADEQUATE LUBRICATION—Wherever you see the sign of Farval—the familiar valve manifolds, dual lubricant lines and central pumping station—you know a machine is being properly lubricated.

Above: Some of the Farvalized presses in operation. At top, superintendent demonstrates action of Farval valve with cutaway section. This valve has only two moving parts, is individually adjusted to deliver any desired amount of oil or grease to the bearing.

Farval is an affiliate of The Cleveland Worm & Gear Co. Manufacturers of industrial worm gearing.

The Farval Corporation, 3296 East 80th Street, Cleveland 4, Ohio

Send Farval Bulletin 25 and details of your free lubrication survey.

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Title_____

Company_____

Street_____

City_____ State_____

SHORTIES

Passenger jets will travel at 500 mph by 1960 and 600 mph by 1970.

•

The steel industry consumed more than 465,000 tons of new manganese in steelmaking operations during 1952.

•

Total exports of steel products from the U.S. in 1952 were 4.160 million net tons, a gain of about 882,000 tons or 27 per cent over the previous year.

•

Because strength at high temperatures is needed, 100 of the 133 materials specified to build a new jet airplane engine are types of steel, comprising 95 per cent of the total weight of materials required.

•

In the past 27 years, the steel industry has doubled its monthly steel output record. The first five-million-ton month was in March, 1926. The first 10 million-ton-month was in March, 1953.

•

By 1960, it is estimated that the U.S. will rely on oil and natural gas for about two-thirds of its energy.

•

The world's largest hotel, if converted into a mammoth storage tank, would hold only enough oil to supply the U.S. for about 10 hours.

•

American motorists and other highway users will pay an estimated $3.256 billion in state automotive taxes during 1953—a figure five per cent higher than the total of last year and 55 per cent higher than the figure of five years ago.

•

To test a jet bomber, the Air Force flew it the equivalent of nearly 17 times around the globe.

Ride to greater sales on

Cr-V steel elliptic springs

Heavy-duty truck and bus manufacturers all agree:

Elliptic springs of Cr-V steel contribute a great deal to customer satisfaction, thus to greater sales.

Superior performance has earned this popularity. Elliptic springs of chromium-vanadium steel combine high flexibility, light weight, and low long-run cost with the fatigue strength to give long life under high stresses.

Build this superior combination into *your* heavy-duty automotive equipment—specify Cr-V steel elliptic springs.

And if you have a particularly difficult application problem on the use of alloy steels for heavy-duty springs—or on any other vital automotive components—get in touch with your nearest Vanadium Corporation office. They will be glad to put their experience to work for you.

Call or write today.

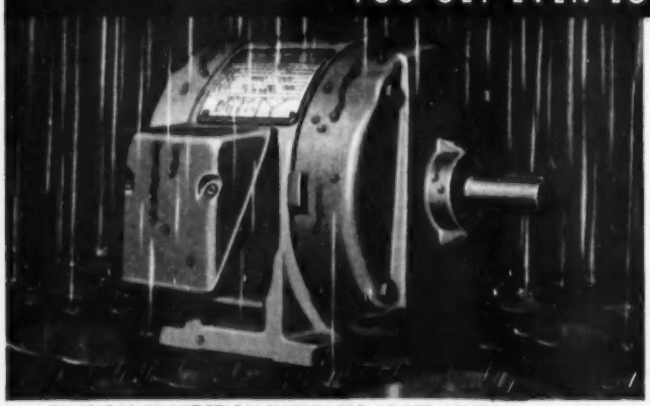
MAKERS OF ALLOYS VANCORAM CHEMICALS AND METALS

VANADIUM CORPORATION OF AMERICA

420 LEXINGTON AVENUE, NEW YORK 17, N.Y.

DETROIT • CHICAGO • CLEVELAND • PITTSBURGH

YOU GET EVEN LONGER MOTOR LIFE



PHYSICAL PROTECTION INCREASED 60 PER-CENT by a complete redesign of cast-iron frame and end shields. This motor is suitable for many jobs where ordinary dripproof motors should not be applied.

EXTRA ELECTRICAL STRENGTH is assured by use of new polyester film insulation. A silicone coating, Dri-film,* virtually eliminates stator insulation failure caused by moisture.

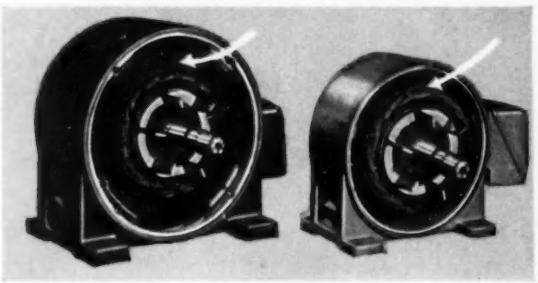
*REG. U.S. PAT. OFF.

TRI 55 CLAD THE LEADER IN MODERN MOTOR DESIGN

GENERAL ELECTRIC ANNOUNCES...

THE ALL-NEW TRI 55 CLAD MOTOR

REG. U.S. PAT. OFF.



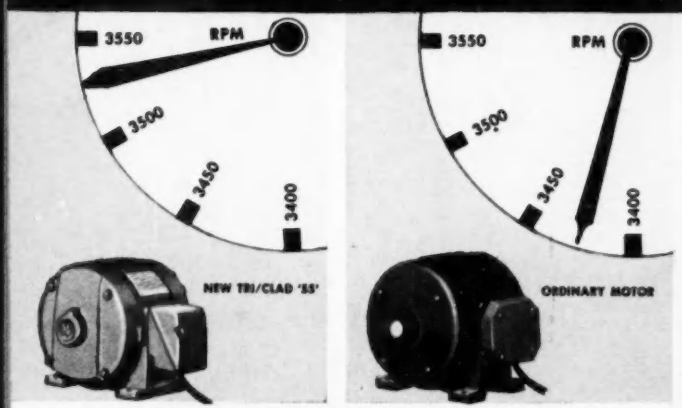
LIGHTER, SMALLER Tri/Clad '55' motors have been made possible through better use of space within the frame. Active materials (magnetic steel, copper) have not been sacrificed.

Complete Line of Dripproof, Enclosed Motors and Gear-Motors Available in Most Ratings in 1954

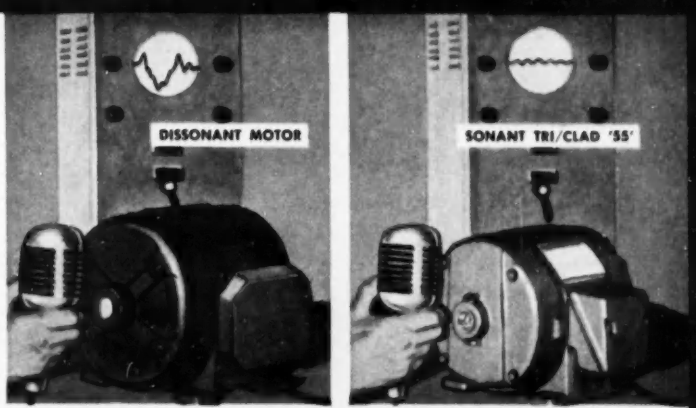
Here's the all-new Tri/Clad '55' motor — now available in NEMA 182 and 184 frame sizes.

You can get complete information on this dramatic motor achievement by writing for bulletin GEA-6013 on Tri/Clad '55' Dripproof motors, GEA-6012 on Tri/Clad '55' Enclosed motors, or GEA-6027 on Tri/Clad '55' Gear-motors, or by contacting your nearby G-E Apparatus Sales Office or G-E Motor Agent. General Electric Company, Section 648-1, Schenectady 5, N. Y.

YOU GET EVEN BETTER PERFORMANCE



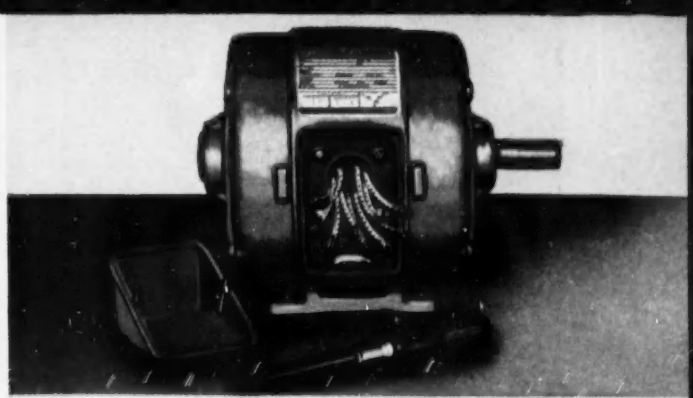
HIGHER FULL-LOAD SPEEDS is only one of many improved characteristics of this new G.E. motor. Above shows comparison of an ordinary motor with the Tri/Clad '55' — both rated at 3600 rpm.



SONANT OPERATION of the new Tri/Clad '55' motor has been laboratory tested and proven. Motor operates at reduced noise level, and operating sound is pitched to a more pleasant frequency.

YOU GET EVEN MORE INSTALLATION AND MAINTENANCE SAVINGS

NEW BEARING SYSTEM allows this motor to run longer than other motors without regreasing. One reason—greatly improved synthesized grease with 8 times the mechanical stability of ordinary grease.



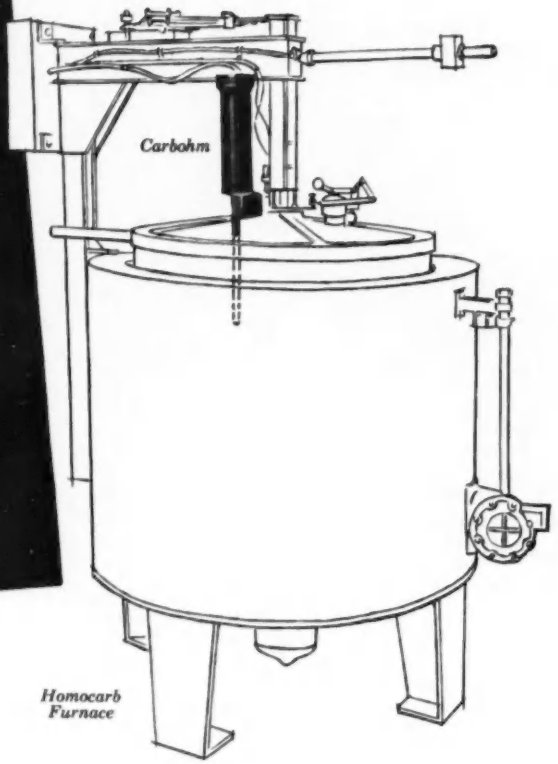
EASIER TO SERVICE, the new Tri/Clad '55' has larger conduit box diagonally split for simplified wiring. Perma-numbered leads mean that even clipped and stripped wires are instantly identified.

Progress is our most important product

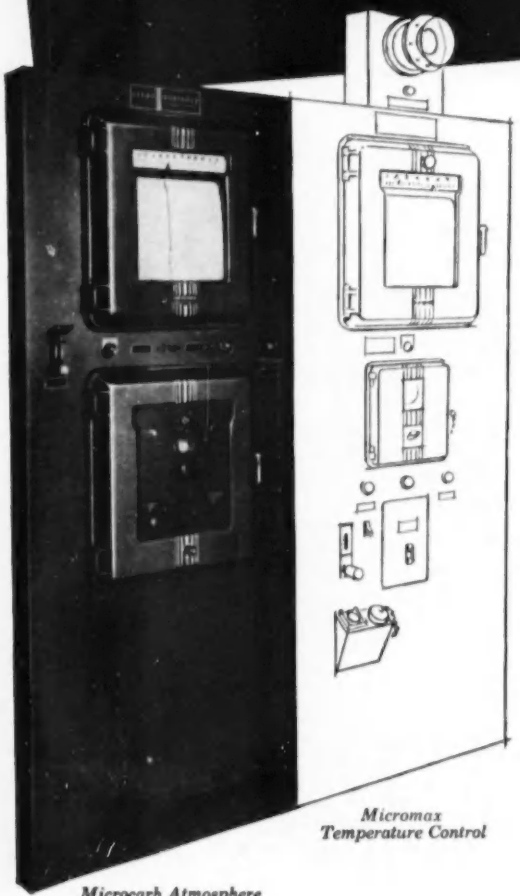
GENERAL ELECTRIC

Want greater versatility

FOR YOUR HOMOCARB® FURNACES?



Homocarb Furnace



Micromax Temperature Control

Microcarb Atmosphere Control

. . . you can get it by adding

Microcarb Atmosphere Control

The addition of Microcarb Control broadens the scope of the Homocarb Method to handle more types of heat treatments and steels than ever before. Microcarb Control provides automatic control of the active carbon in the furnace atmosphere . . . a control which is simple to set, and which draws a continuous record of percent carbon for each heat-treat cycle.

With Microcarb Control it is now possible to: 1. harden steels under a protective atmosphere which neither adds carbon nor decarburizes the surface of the steel; 2. homogeneously carburize thin section parts from a low carbon steel to a specified higher carbon content; 3. restore decarburized surface layers to a specified carbon content to match the core; and 4. case-carburize steels to controlled maximum surface carbon content.

Microcarb Control can be added to your already-installed Homocarb furnaces by your own maintenance crew. For more information just write us at 4966 Stenton Ave., Philadelphia 44, Pa., or contact the L&N office nearest you.

LEEDS NORTHRUP

instruments — *automatic controls • furnaces*

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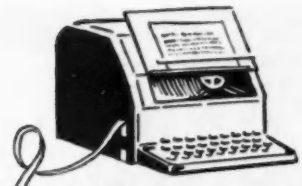


ON OUR WASHINGTON WIRE

Automobile dealers selling cars made by one company can run afoul of Federal Taft-Hartley Act, even if they operate entirely within one state. U. S. Supreme Court makes clear the law may be used against such dealers if they are charged with "unfair" labor practices. These practices could include firing an employee for union activities or refusal to bargain on working conditions.

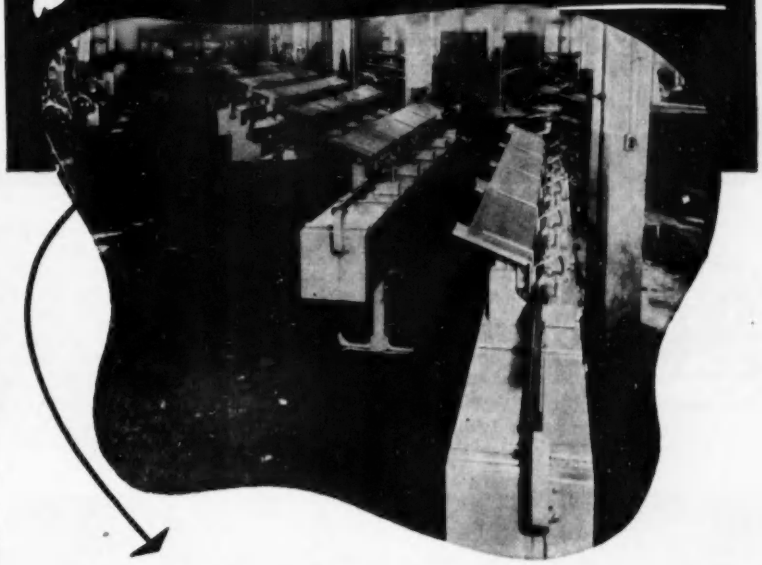
Moves to revise Fair Labor Standards Act this year probably will include Administration backing for 90-cents-an-hour minimum wage. Inclusion of all business could mean an advance of wages all along the line, leading to a new cost spiral.

Chances seem good that Congress may vote increased funds for Federal aid to highways this year, but how much more than the current $575 million is anybody's guess. In any event, it is not likely to reach the $900 million advocated by state highway officials.

Federal Reserve Board has discarded its system of measuring industrial production, set up in 1920, and will henceforth use a more modern index. A major basic change will be the inclusion of 175 industries within the surveys used for the index instead of the 100 previously used.

Defense production will be the need first taken care of in assignment of the use of military-owned machine tools and related equipment, according to a recent Defense Dept. directive. Aim is to insure that production tools will continue to be available for mobilization needs.

LIPE AUTOMATIC MAGAZINE LOADING BAR FEEDS *Doubled* PRODUCTION!



The machined worm wheel shaft and agitator rod shown below are typical of the many parts turned out on a bank of seven screw machines equipped with Lipe AML Bar Feeds at Hamilton Beach Division, Scovill Mfg. Co., Racine, Wis., manufacturers of food mixers, vacuum cleaners, hair dryers and other motorized appliances.

No lost time in loading and hand feeding! . . . No scratching of high-finish stock! . . . No idle operation of screw machines! . . . Maximum production capacity fully maintained!

Long worm wheel shaft .3125" dia. machined from piston rod finish, cold-drawn steel. When the Lipe AML Bar Feed automatically loaded and fed the stock to a Model 2G B&S, *production increased 100%* over conventional loading operation.

Agitator rod .250" dia. machined from S.A.E. #1112 Bessemer wire. When the Lipe AML Bar Feed automatically loaded and fed the stock to a Model 00G B&S, *production increased 100%* over conventional loading operation.

On job after job there is proof—like these examples from a typical four-week production run—that Lipe Automatic Bar Feeds insure big production gains, BECAUSE:

- **Stock is fed to screw machines all the time . . . not dependent on operator.**
- **Pressure constantly behind stock.**
- **Eliminates feed fingers.**
- **Avoids multiple feed finger feedouts.**
- **Model AML gives maximum output of machine . . . no "cutting air."**
- **Saves changeover set-up time.**

Get full details on how this machine will increase production and save you money. It's today's big advancement in screw machine stock feeding. Our engineers will gladly study your problem . . . no obligation.

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Manufacturers of Automotive Clutches and Machine Tools

Syracuse 1, N. Y.

seven ways you save

WITH REYNOLDS FABRICATING FACILITIES

These photographs are representative of the tremendous Reynolds fabricating facilities . . . facilities that make possible seven basic economies to every manufacturer who uses Reynolds Aluminum Fabricating Service.

Not shown in these photographs, are two equally important advantages that Reynolds offers manufacturers. One, quality and production control from mine to finished product. Two, experienced design and engineering service.

You'll see *proof* of the latter advantages—along with proof of the seven basic economies pointed out in the photo captions—in each aluminum blank, roll formed shape, completed part or final assembly you get from Reynolds.

For your present needs or for development work on future models, contact your nearest Reynolds office listed under "Aluminum" in your classified telephone directory or write for your copy of the new "Complete Facilities" catalog to Reynolds Aluminum Fabricating Service, 2087 South Ninth St., Louisville 1, Ky.

2 **Reynolds REDUCES YOUR RAW MATERIAL INVENTORY**

You get *pounds of parts* instead of pounds of metal when you use Reynolds Aluminum Fabricating Service. Like the automobile manufacturer who will receive the extruded aluminum window frames above, you can save, too, by cutting out that costly part of your metal inventory that does not go into finished parts. Over 30 Reynolds plants in 18 states are at your service!

3 **Reynolds RELEASES YOUR VALUABLE FLOOR SPACE**

Pictured above are just a few of 6,000 *different parts* for a single plane in production at Reynolds plants at one time during World War II. Imagine the floor space required for this production. Imagine the floor space *you* can save in *your plant*—space you can put to profitable use—when you call on Reynolds Aluminum Fabricating Service to turn out aluminum parts for your products.

4 **Reynolds ADDS TO YOUR CAPACITY WITHOUT INCREASING COSTS**

Here, in the photograph above, aluminum TV antenna is being formed on one of the seventeen Reynolds roll forming machines. The great variety of Reynolds specialized equipment enables you to obtain the economy of the machines best suited to your purpose, without making the tremendous capital investment in equipment and added plant capacity which would otherwise be required.

REYNOLDS ALUMINUM

BLANKING • EMBOSSING • STAMPING • DRAWING • RIVETING • ROLL

1 Reynolds CUTS YOUR SCRAP LOSS AND SCRAP HANDLING COSTS

The aluminum blanks on the conveyor at left are ready to go to a washing machine manufacturer. The scrap beside the press is remelted immediately right at the Reynolds plant. Thus Reynolds Aluminum Fabricating Service saves you—the manufacturer—an average of 30% scrap loss and also eliminates scrap handling expense on your part in sorting, storing and shipping.

5 Reynolds CUTS YOUR MATERIAL HANDLING COSTS

The aluminum pallets above will reduce material handling costs in many plants . . . and the manufacturer of these pallets is also reducing *his* material handling costs by getting *pounds of parts*, not pounds of metal, from Reynolds Aluminum Fabricating Service. Reynolds also takes the problems of scheduling, material supply, labor and machine availability off his—and your—hands!

6 Reynolds RELEASES YOUR WORKING CAPITAL

When you use Reynolds Aluminum Fabricating Service you receive 100% of your aluminum in finished parts. And, as these parts are generally assembled into finished products before invoices come due, no investment is tied up in raw metal. These quality parts, like the shells of the aluminum cookers being buffed above, are available in a wide choice of finishes including color-anodized.

7 Reynolds ELIMINATES YOUR REJECT COSTS

Reynolds Aluminum Fabricating Service does away with your machine and labor production losses and inspection expense in rejects, because you pay only for finished, inspected parts. The conveyor line above, where refrigerator door trays are carefully inspected before packing and shipping, is just one of the many examples of Reynolds quality control from mine to finished product.

See "Mister Peepers" Sundays on NBC-TV. Consult local listing for time and station.

FABRICATING SERVICE

SHAPING • TUBE BENDING • WELDING • BRAZING • FINISHING

Causes of Failures in Ball Thrust Bearings

A RECENT report issued by **Aetna Ball & Roller Bearing Co.**, dealing with some occasional failures of pure thrust bearings used in aircraft hydraulic pumps, should add some interesting information to the material being accumulated on the subject of wear, durability, and fatigue phenomena.

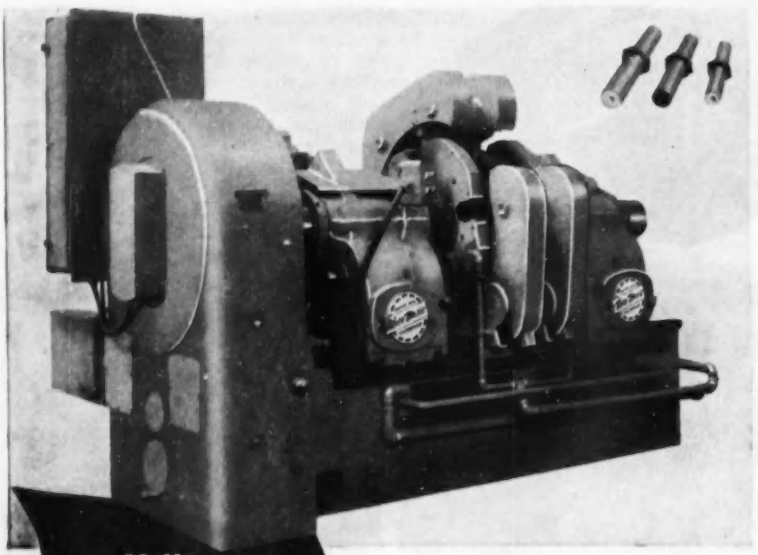
It was observed that the predominent cause of failure in bearings returned from the field was a shallow type fatigue. Although this phenomenon has been studied for some time, it was only recently that investigation has revealed the actual cause for this condition. The course of progressive fatigue failure has been traced in the series of illustrations reproduced here.

Fig. 1 shows the type of scuffing resulting from gyrating balls, under high speed, low load operating conditions. The beginnings of shallow fatigue developing from the action of balls rolling over the scuffs or

Fig. 1—Photograph of thrust bearing race showing the nature of scuffing or scratches resulting from ball gyration under conditions of high speed, light load.

scratches is seen in Fig. 2. As this condition persists over a period of time there is a further spreading of

Fig. 2—This illustrates the beginning of shallow fatigue failure as the balls continue to roll over the scuffed raceway.



Milling and Centering Simultaneously and in Continuous Production

Here's an excellent example of how two entirely different operations can be combined on one machine. This Davis and Thompson continuous type Roto-Matic both mills and centers on both ends in one operation. Rough and finish milling cuts on the ends of the shaft and centering of both ends is completed with only one rotation of the fixture drum. The centering heads travel with the work station until centering operation is complete then drop back to next work station and repeat. Automatic equalizing clamping is provided to the fixture. Spindles have micrometric adjustment and spindle carriers are adjustable on the ways to accommodate shafts of various lengths.

FREE DATA on this and other Davis and Thompson machines is available in our bulletin No. 1000.

Roto-Matic

Davis and Thompson Co.

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Your buildings are dangerous WITHOUT COMPLETE SAFETY IN THIS KEY AREA

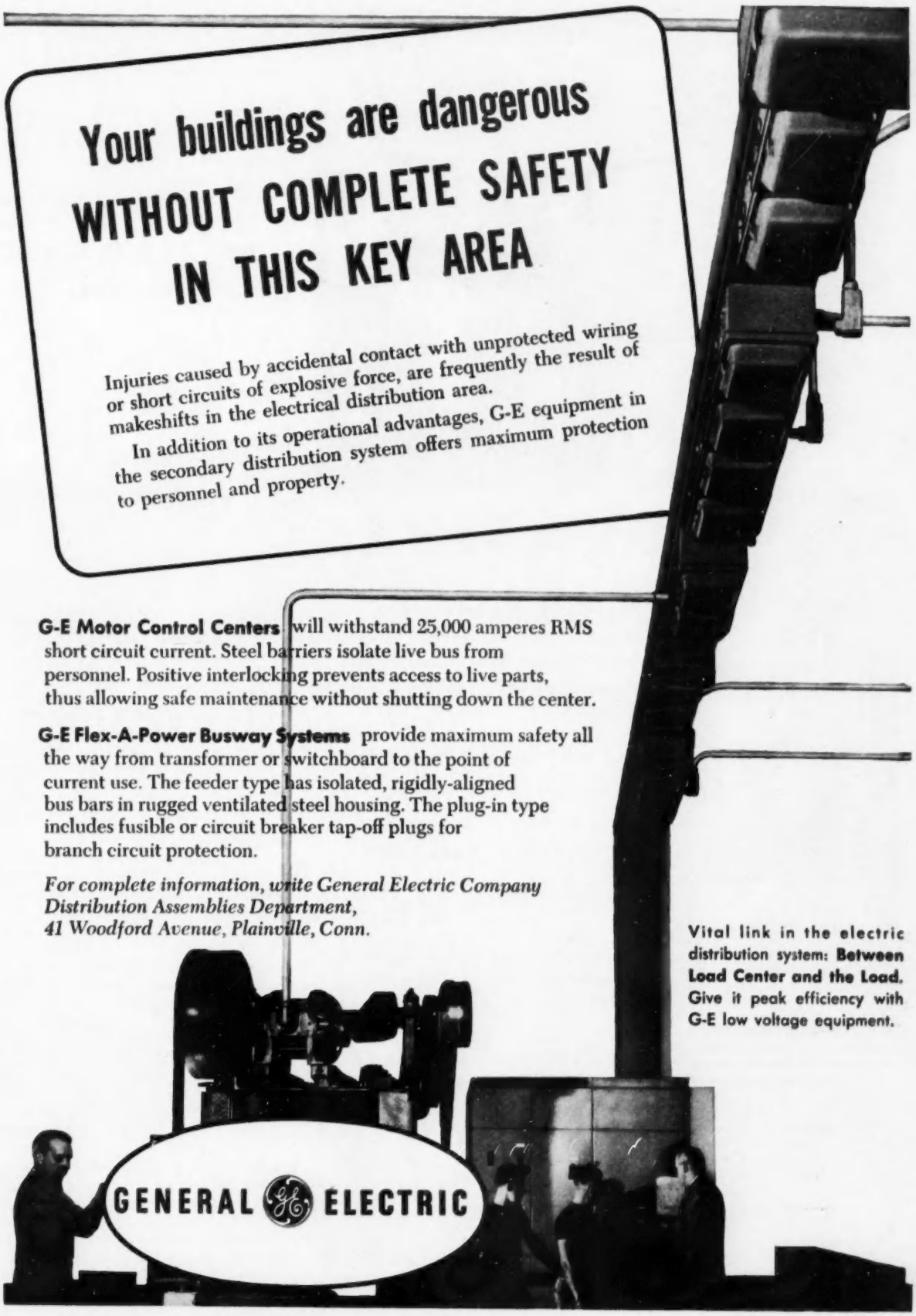
Injuries caused by accidental contact with unprotected wiring or short circuits of explosive force, are frequently the result of makeshifts in the electrical distribution area.

In addition to its operational advantages, G-E equipment in the secondary distribution system offers maximum protection to personnel and property.

G-E Motor Control Centers will withstand 25,000 amperes RMS short circuit current. Steel barriers isolate live bus from personnel. Positive interlocking prevents access to live parts, thus allowing safe maintenance without shutting down the center.

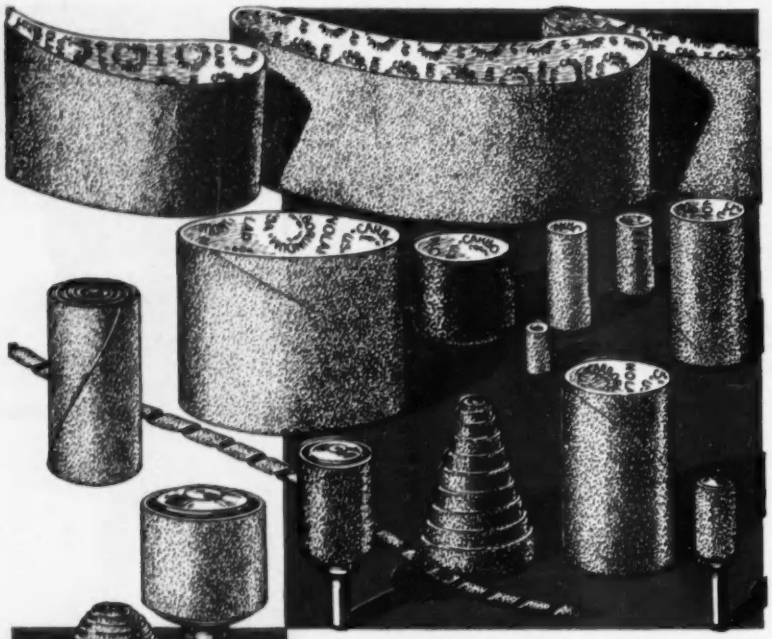
G-E Flex-A-Power Busway Systems provide maximum safety all the way from transformer or switchboard to the point of current use. The feeder type has isolated, rigidly-aligned bus bars in rugged ventilated steel housing. The plug-in type includes fusible or circuit breaker tap-off plugs for branch circuit protection.

For complete information, write General Electric Company Distribution Assemblies Department, 41 Woodford Avenue, Plainville, Conn.



Vital link in the electric distribution system: **Between Load Center and the Load.** Give it peak efficiency with G-E low voltage equipment.

GENERAL ELECTRIC



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the ball contact and eventually these localized fatigue areas begin to have inadequate side clearance for true rolling contact of the balls.

This tends to accelerate destruction of the race, as shown in Fig. 3. The sketch at the upper portion of this illustration shows the normal pattern of ball action with the race under loaded conditions. At this point, the center section, which is unshaded, is under heavier loading and with true rolling action. The side sections, shaded portions, show some slippage. While the slippage areas on the normal race are rather small, it will be noted that slippage occurs across the entire area in the lower sketch where fatigue action has become severe.

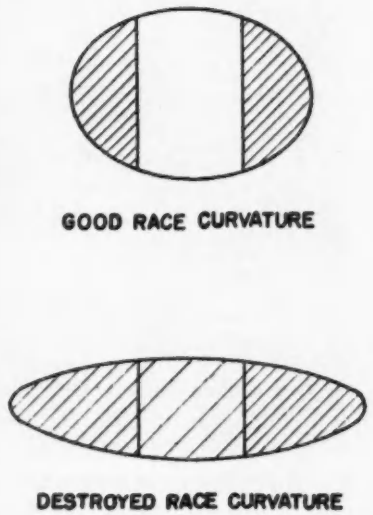

Fig. 3—Sketches indicating ball-to-race contact pattern under normal conditions—at top—and slippage pattern across the entire area after fatigue action has progressed, at bottom of illustration.

Fig. 4 illustrates a peculiar type of fatigue failure noted at complete destruction of a race. Here the race curvature was found to be equal to the ball curvature while the balls were found to be from 0.002 to 0.003 in. under size.

The baffling fact is that this type of failure has not been experienced with another type of installation where operating conditions appear to be much more severe with respect to combinations of high speed and light load. The time element does not ap-

(*Turn to page* 142, *please*)

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for 46 years . . .
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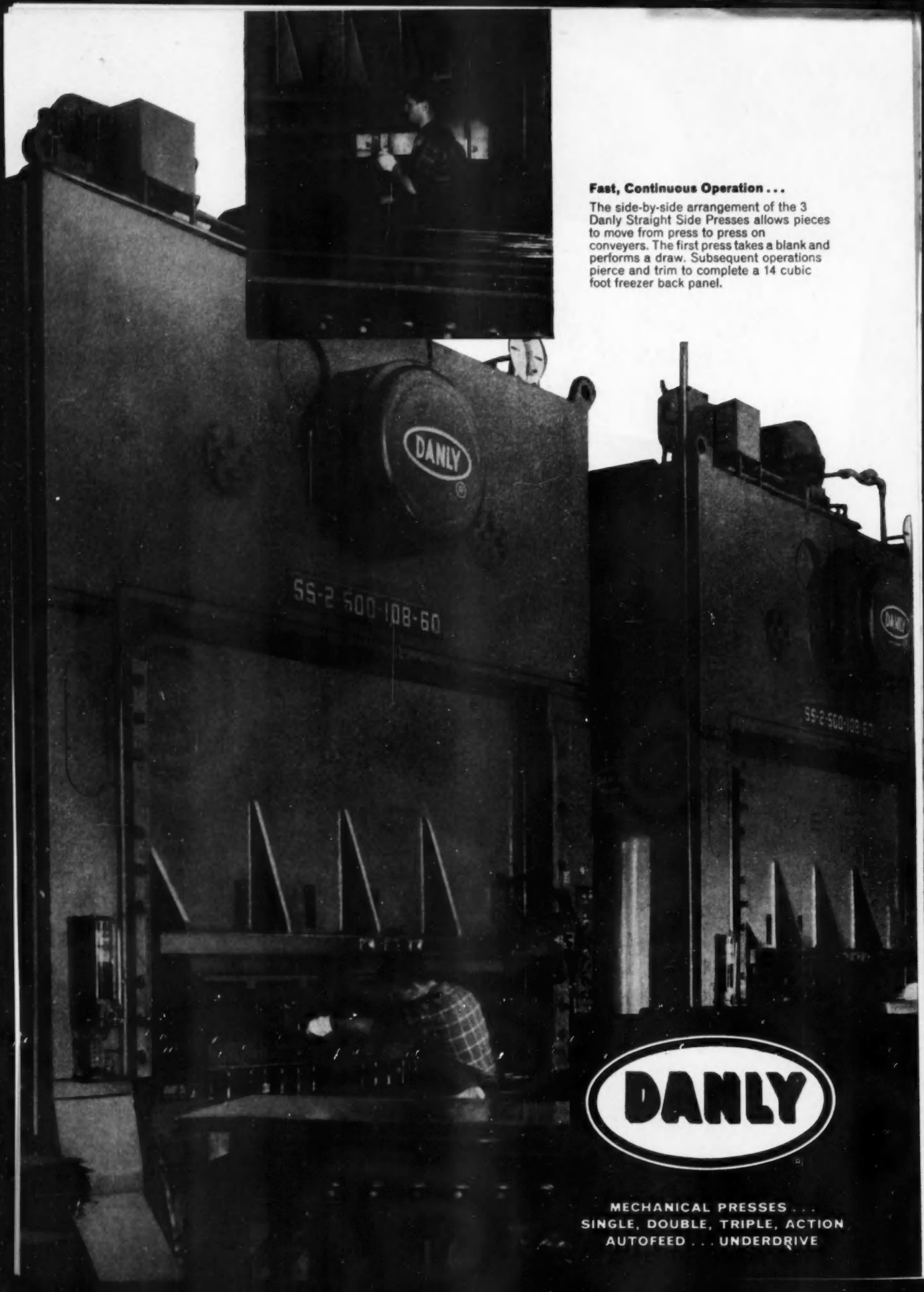


Fast, Continuous Operation . . .

The side-by-side arrangement of the 3 Danly Straight Side Presses allows pieces to move from press to press on conveyers. The first press takes a blank and performs a draw. Subsequent operations pierce and trim to complete a 14 cubic foot freezer back panel.

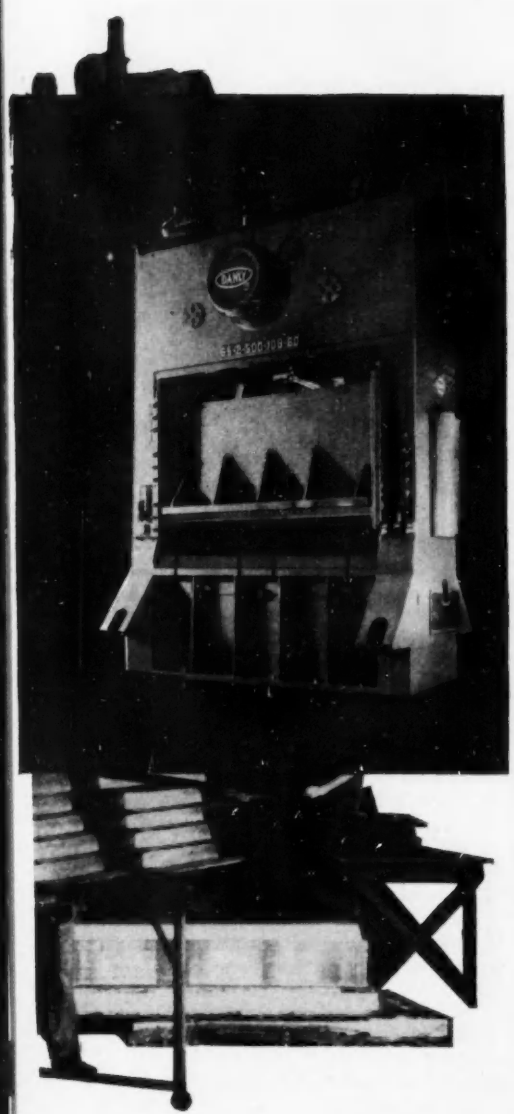
DANLY

MECHANICAL PRESSES . . .
SINGLE, DOUBLE, TRIPLE, ACTION
AUTOFEED . . . UNDERDRIVE

How can you

maintain high stamping production

with frequent job changes?



GENERAL ELECTRIC COMPANY does it on their

DANLY PRESSES

Today it's 14 cubic foot freezer backs . . . tomorrow it may be any of 15 other stampings. With such frequent job changes and schedules pushing capacity to the limit, GE faced the problem of keeping production high and down-time losses low.

The solution? They found it in Danly 500-ton Straight Side Presses . . . setting new performance standards in meeting the demands of one of the most intensely competitive markets in American industry . . . uninterrupted production runs with minimum down-time for job changes or routine maintenance.

That's why you find more and more complete lines of Danly presses doing a better job in leading stamping plants like this. They're smoother, quieter and easier to operate for continuous production at full capacity. Why not prove it to yourself? Write for free booklet on Danly Straight Side Presses and get all the facts.

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It costs less to run a DANLY PRESS!

If your manufacturing process involves high production and expensive dies, it will probably be worth your while to talk with a Danly Press Engineer. Call now—he will be glad to discuss your specific problems. There is no obligation for this service.

only 53 seconds
to grind 12 valve seats
Here's a production valve seat grinder that really saves labor — cuts production costs — reduces wheel wear. It's fast — only 53 seconds elapse between the time this cylinder block reaches the table and is completed. It's better—the eccentric grinding gives seats a finer finish and true accuracy.
If you have any production valve seat grinding problems *write today.* We can offer machines that will grind 8, 12 or 16 valve seats in less than 1 minute. Or, if yours is a special problem, we can put at your disposal years of experience in designing similar production machines for Ford, GM, Chrysler, Willys, Cummins, International Harvester, Wisconsin, Hillman, Jaguar, and many others.
You'll save money
get a better job
with Eccentric Grinding

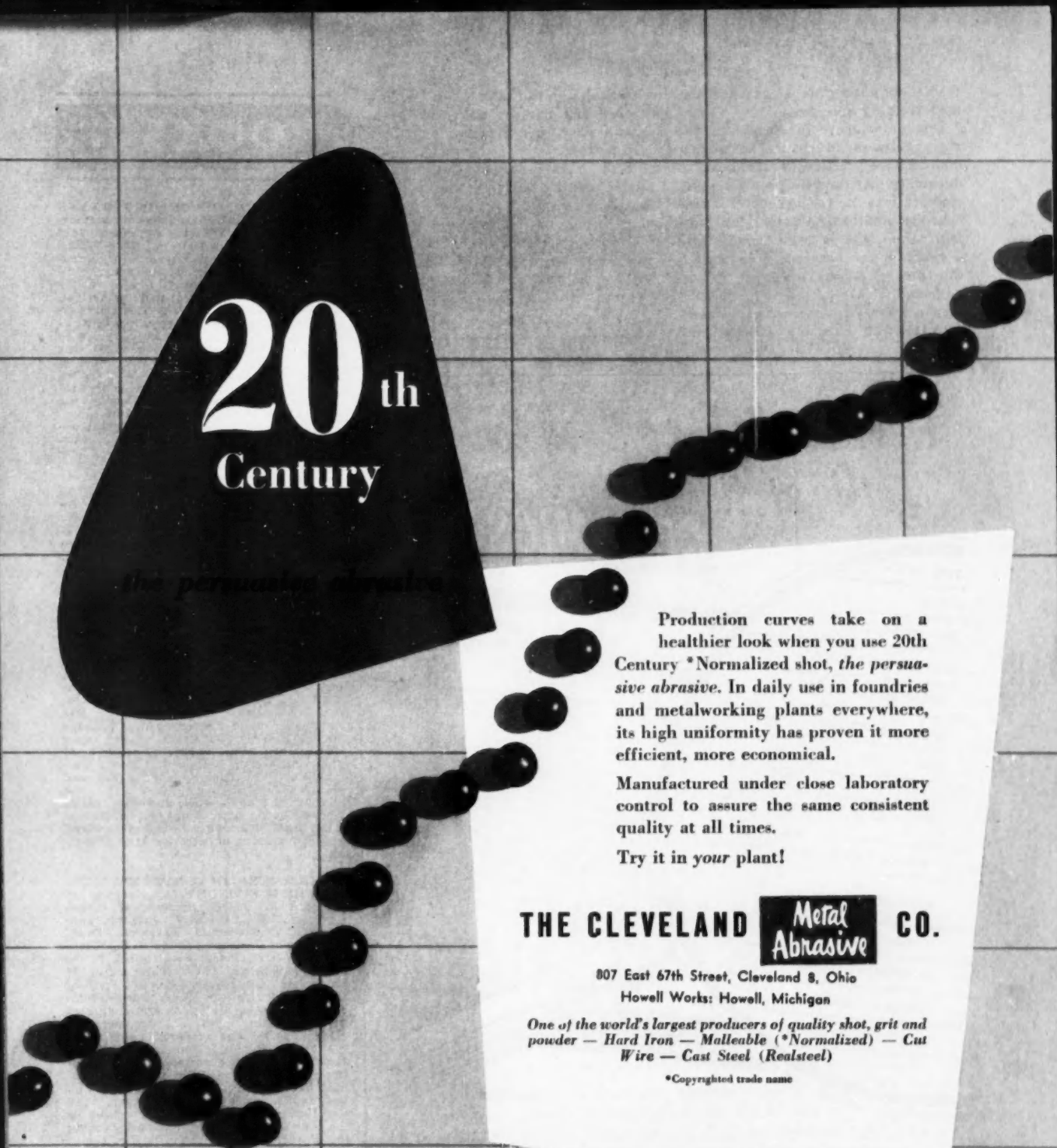
(*Continued from page* 138)

pear to be a factor since the severe gyrations responsible for the kind of fatigue failure described here occur instantaneously when the bearing is under light load at high speed. As a matter of fact, it is suspected that the particular bearing samples under study might have gone through a phase of zero loading at high speed.

Although these gyration effects do not appear frequently, the problem is important enough to warrant further investigation. Aetna reports that sample bearings have been tried with larger diameter balls and greater angular contact. The results were about the same: the change improved resistance to gyrations but this was negated by the effects of increased centrifugal forces. Another avenue to be explored in this direction is to effect a slight increase in angular contact, using balls of the same size.

Fig. 4—Peculiar nature of the raceway surface after fatigue failure due to ball gyration. Balls in this type of failure were found to be from 0.002 to 0.003 in. undersize.

During the course of the investigation part of the problem seemed attributable to metallurgical variations, since an increase in unscheduled bearing removals was traced to a particular heat of steel. Analysis indicated that the bearings contained a small percentage of retained austenite, despite the fact that Aetna's heat treating procedure incorporates a double tempering operation, designed to prevent retention of austenite. Currently, the metallurgical department is investigating the technique of deep-



Production curves take on a healthier look when you use 20th Century *Normalized shot, *the persuasive abrasive.* In daily use in foundries and metalworking plants everywhere, its high uniformity has proven it more efficient, more economical.

Manufactured under close laboratory control to assure the same consistent quality at all times.

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THE CLEVELAND Metal Abrasive CO.

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*One of the world's largest producers of quality shot, grit and powder — Hard Iron — Malleable (*Normalized) — Cut Wire — Cast Steel (Realsteel)*

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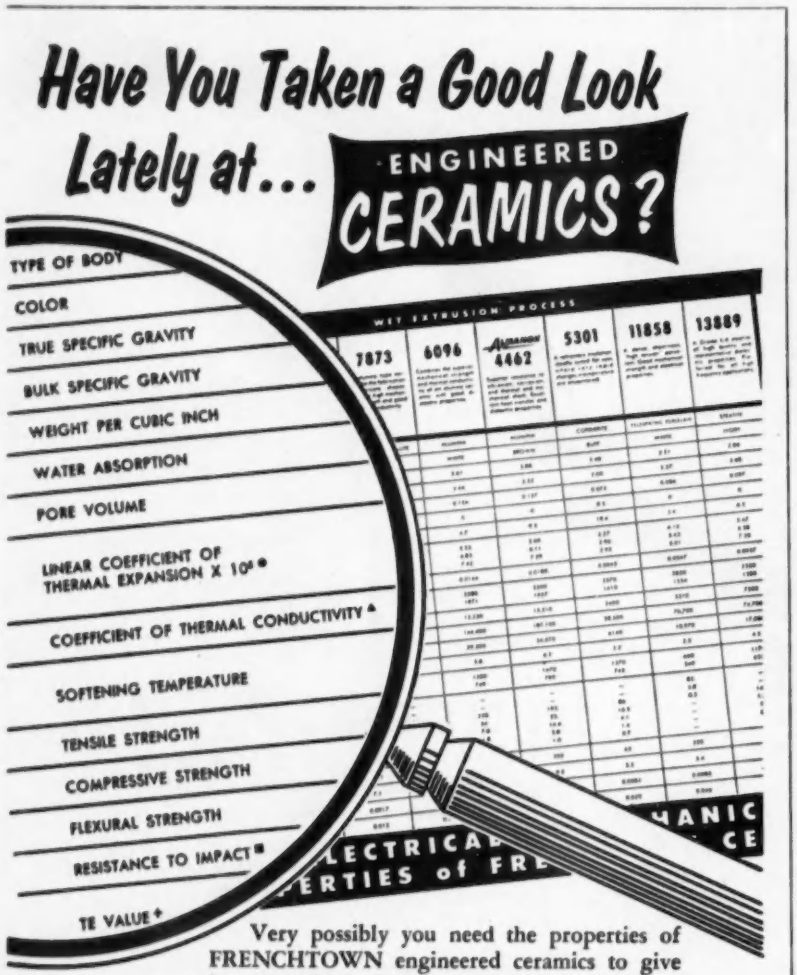
freeze stabilizing as a part of the heat treating specification.

Due to pressure for increased periods between overhauls in airline maintenance practice, greater bearing durability is essential and several modifications in the design of these bearings are being readied for testing. One type is being made with a relief in the bore so as to permit the press-fit race to effect better alignment. Another sample type incorporates larger balls and heavier race sections. It is felt that this particular design can tolerate an increase in ball size without risk since gyration has not been a factor in its failure pattern.

Still another development, already under test, is a self-aligning type of bearing designed to compensate for possible off-parallel loading.

Test work in other directions is being conducted to determine the effects of various types of surface finishes in the raceways.



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Why not send for this chart showing electrical and mechanical characteristics of FRENCHTOWN high-performance ceramic bodies. Name your problem; we'll also send test samples.

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BOOKS ...

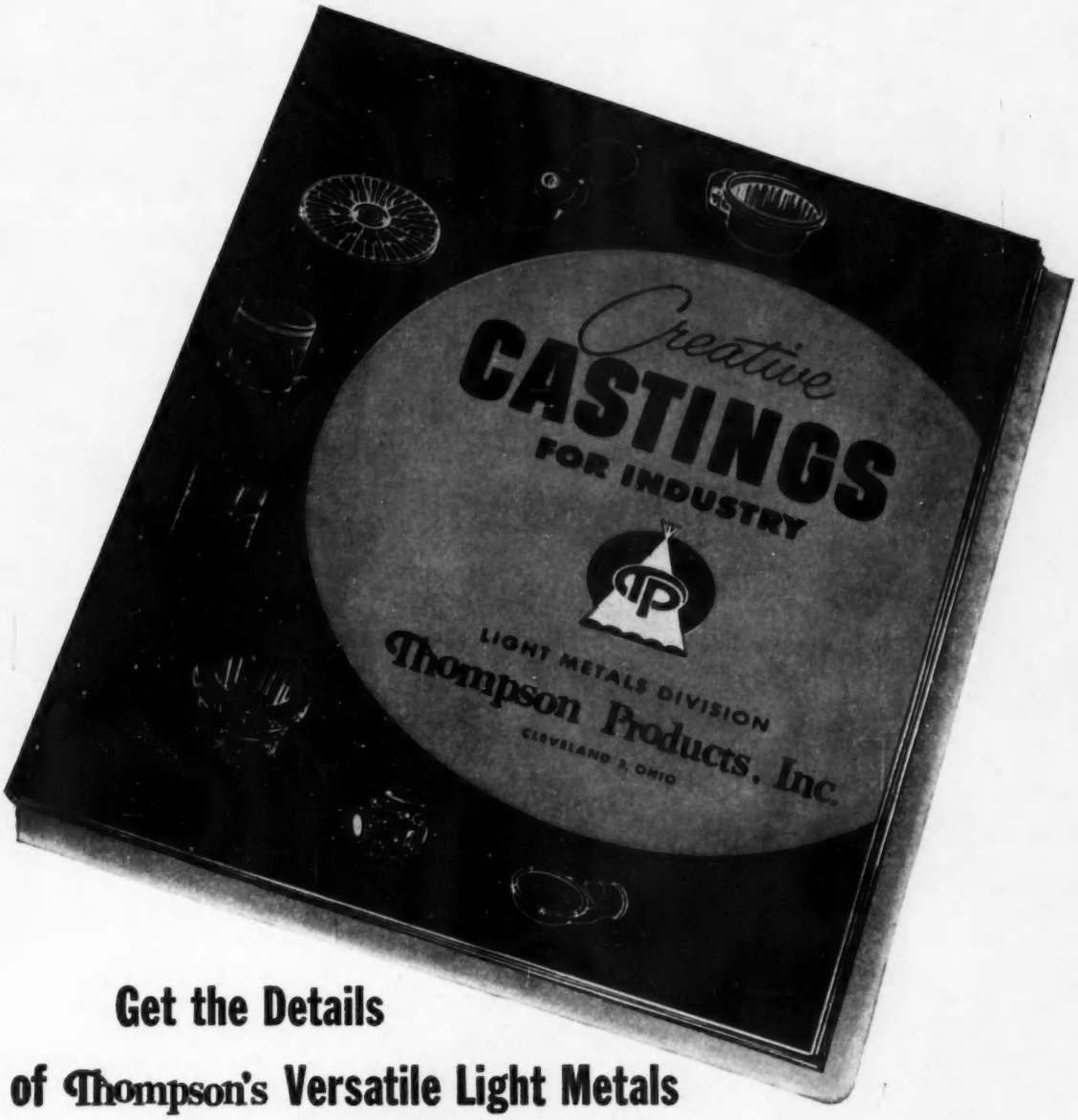
SYMPOSIUM ON CONDITIONING AND WEATHERING, *published by American Society for Testing Materials, 1916 Race St., Philadelphia 3, Pa. Price, $2.25.* Many of our highly useful engineering materials are affected by atmospheric influences, mostly adversely. A wide variety of materials such as paper, adhesives, textiles, plastics, cement, electrical insulating materials, all require temperature and humidity conditioning prior to if not during testing. Because of this need, this Symposium was sponsored by ASTM Committee E-1 on Methods of Testing. Its principal purpose is to provide an expanded understanding of the importance of conditioning and weathering in the assessment of materials of engineering and to encourage further effort to utilize controlled atmospheric phenomena in laboratory procedures.

HANDY-QUICK TOLERANCES, *by Alexander Michael, Sr., published by Handy Length Book Co., 3507 17th St., S.W., Canton, O. Price, $1.00.* This booklet contains tables most commonly used in industry. It also has new and quick methods for learning and memorizing industrial fractions and decimal equivalents.

MANUAL OF TRAFFIC ENGINEERING STUDIES, *published by Accident Prevention Dept., Association of Casualty and Surety Companies, 60 John St., New York 38, N. Y. Price, $3.75.* This revised and expanded edition treats the methods, forms, and analysis of traffic studies essential to a factual approach to the solution of traffic problems. Featuring 253 illustrations and 27 tables, the 278-page manual covers 28 different traffic studies successfully conducted by recognized practicing traffic engineers. Other sections deal with the origin, financing, and planning of surveys, as well as the analysis of traffic trends, statistical treatment of traffic data, comparing before and after studies, drawing up questionnaires, and preparation of effective traffic study reports.

THE AMERICAN COMPETITIVE ENTERPRISE ECONOMY, *by Emerson P. Schmidt, R. Buford Brandis, W. Glenn Campbell, and Thomas F. Johnson, published by Economic Research Dept., Chamber of Commerce of the U. S., Washington 6, D. C. Price, complete set, $6.00; single pamphlets, $0.50.* This set of 17 pamphlets has been issued in the form of an economics primer. Each pamphlet includes discussion questions and suggested further reading. The 17 pamphlets include: The Mystery of Money; Control of the Money Supply; Money, Income and Jobs; National Income and Its Distribution; Progress and Prosperity; Sustaining Prosperity; Demand, Supply and Prices; Prices, Profits and Wages; Why the Businessman?; How Competitive is the American Economy?; Understanding the Economic System and Its Functions; Spending and Taxing; Taxing, Spending and Debt Management; Labor and the American Economy; Individual and Group Security; International Trade, Investment and Commercial Policy; Ethics of Capitalism.

KEY TO SURVIVAL AND GROWTH, *published by National Machine Tool Builders' Association, 10525 Carnegie Ave., Cleveland 6, O. Price, $0.50.* This booklet summarizes training methods for use in the metalworking industry. It reviews learner training, apprentice training, and graduate engineering programs currently in effect in many machine tool companies and lays down specific instructions whereby any company, large or small, can start an effective training program.



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IF you use castings, you'll want this booklet which describes the versatile foundry facilities available to you at Thompson Products' Light Metals Division.

Over 50 years experience in research and manufacture of precision metal parts enables Thompson today to offer its facilities to all types of industry.

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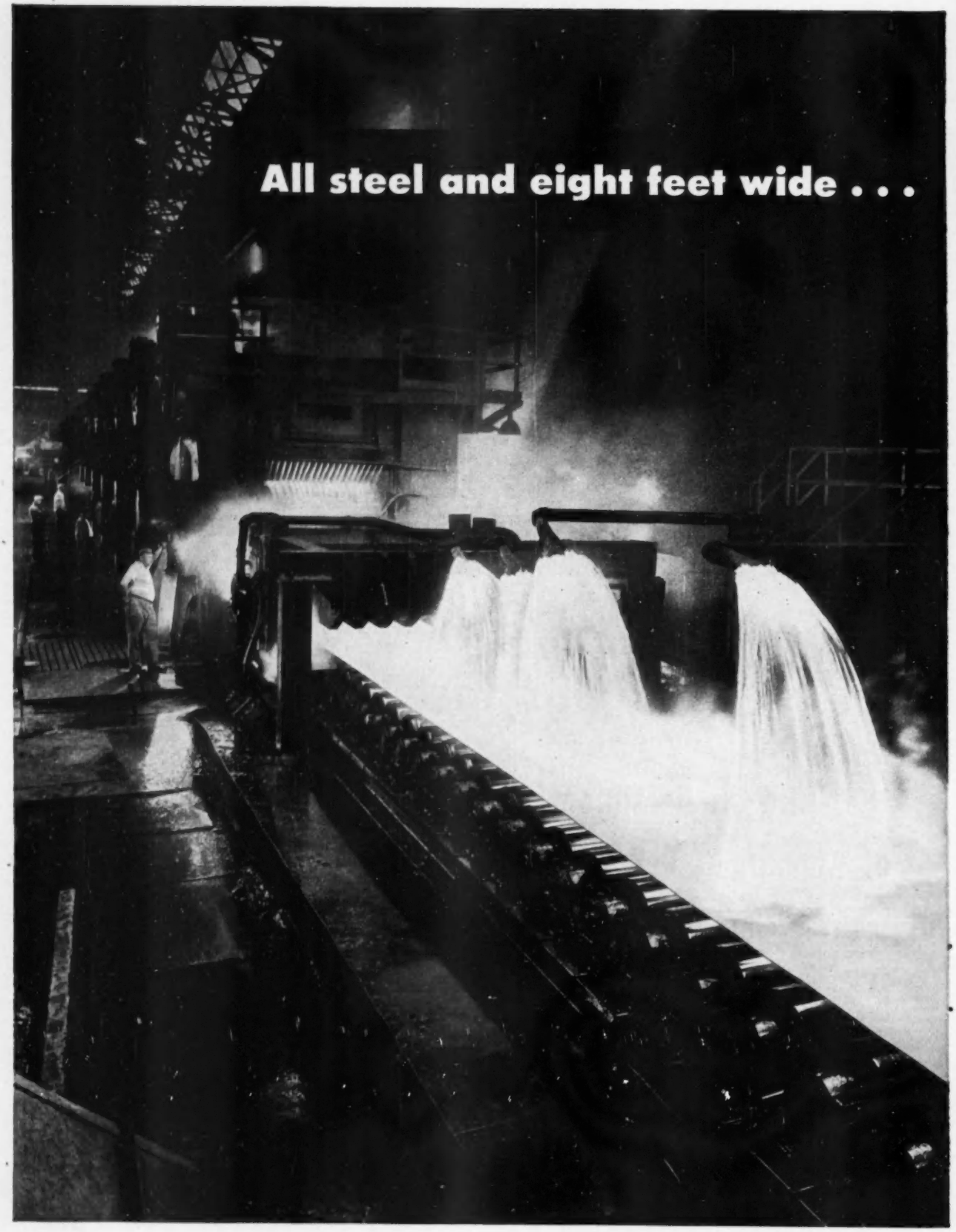


GREAT THINGS

designed for the automotive industry

Here's the 96-inch strip mill at Great Lakes Steel. It makes a great, broad, beautifully smooth sheet that finally finds its way to your garage in the body of a sleek sedan. No one makes sheet steel any wider than this.

And not all steelmakers undertake to make it as wide. The reason Great Lakes does it is that Great Lakes set out in the first place, many years ago, to be a *dependable first source* of sheet, strip, and other shapes needed by manufacturers, particularly in the making of automobiles. That's what we are today, with an annual capacity that has reached four million ingot tons—about 25% of the carmakers' total needs for steel, and about 40% of their appetite for the kinds of steel we supply.

To put that wide sheet into the hands of automobile men—so that their heavy presses can draw the strong one-piece tops that mark today's closed cars—it takes a lot of steelmaking operations. At Great Lakes, we do all these operations ourselves. We start with the ore, and work it through blast furnaces, bessemers, open hearths, blooming mills, hot and cold rolling mills and merchant mills, right down to the finished forms. This integration gives us *flexibility* that lets us do a real job. Add our availability—here in the heart of the automotive industry—and you can see how we've come to qualify as that *dependable first source.*

Great Lakes is distinguished among steel suppliers not only as the industry's foremost specialist in flat-rolled products, but also as the developer of low-alloy, high-tensile steels now important to manufacturers. Many an engineer has been able to work out problems otherwise difficult to solve with the help of our N-A-X HIGH-TENSILE steel, whose formability and corrosion-resistance, among other advantages, suit it to a number of tough jobs.

You can expect more great things to happen at Great Lakes Steel. For we aim to serve well our many customers in many fields, while keeping pace with the increasing needs of the mighty automotive industry. *Great Lakes Steel Corporation, Detroit 29, Michigan.*

Offices also in Chicago, Cleveland, Grand Rapids, Lansing, New York, Philadelphia, St. Louis and Toledo.

Great Lakes Steel

NATIONAL STEEL CORPORATION

HAPPEN AT GREAT LAKES STEEL

BOOKS ...

TAX PLANNING FOR FOUNDATIONS AND CHARITABLE GIVING, *by William J. Casey, J. K. Lasser, and Walter Lord, published by Business Reports, Inc., Roslyn, L. I., N. Y. Price, $12.50.* Government policy resulting in high taxes and inflation has seriously weakened the finances of churches, private schools, and charities. Inflation has increased their costs, while high taxes have dried up large sources of support. In this new research study, the authors analyze the public policy which gives tax concessions for charitable gifts made by individuals and businesses. It spells out how churches, charities, and schools can aid in meeting financial problems of individuals and businesses and, by doing so, increase their own financial strength.

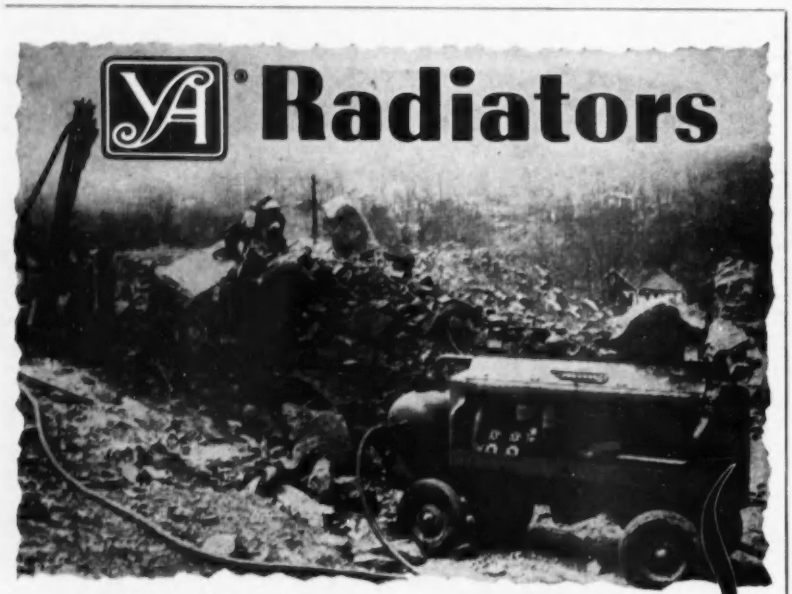
AN INTRODUCTION TO POWER SYSTEM ANALYSIS, *by Frederick S. Rothe, published by John Wiley & Sons, Inc., 440 Fourth Ave., New York 16, N. Y. Price, $5.00.* The author considers the characteristics of each building block in the modern power system, and analyzes the components of the generator, transformer, transmission line, and the load. While his scrutiny of synchronous machine theory, transformer theory, transmission line theory, symmetrical components, and stability is confined to the problems associated with the fundamental operating frequency, he also investigates the transient behavior of the components during disturbances.

A GRAPHIC IMPRESSION OF MINNESOTA RUBBER, *published by Minnesota Rubber & Gasket Co., 3060 Wooddale Ave., Minneapolis 16, Minn. Price, $4.00.* This 52-page encyclopedia covers in detail the processes and standards used in production of molded rubber components. The opening section is devoted to a description of the company's management and facilities. The following section treats industry standards of specifications and testing in the rubber field. The third section covers general information, uses, charts, and specifications for the firm's four types of industrial seals. Subsequent divisions illustrate the firm's custom molding operations, use of leather back-up washers, silicone rubber, and additional charts and tables for hardness conversion, decimal equivalent, temperature conversion and pressure and steam. A final section includes a comprehensive glossary of rubber terms.

DIE GASMASCHINE (The Gas Engine), *by Dr.-Ing. Max Leiker, published by Springer-Verlag, Vienna, Austria. Price, $11.45.* In Continental Europe a number of new gaseous fuels have come into use, largely owing to the scarcity or non-availability of petroleum products during the two world wars. Among the gases used are those produced in gas generators from coal, coke, or wood; sewage gases (chiefly methane) recovered in sewage purification plants, and blast-furnace gases. During World War II recourse had to be had to these substitute fuels, and engineers were confronted with the problem of converting or adapting existing Otto and Diesel engines to their use. This book deals largely with development work carried out with this object in view. It contains 260 pages and 358 illustrations.

PRINCIPLES OF TRANSISTOR CIRCUITS, *edited by Richard F. Shea, published by John Wiley & Sons, Inc., 440 Fourth Ave., New York 16, N. Y. Price, $11.00.* Compiled in this book is a large portion of the existing research material on transistor circuits. Written by recognized authorities, it provides basic theory, plus an elaboration of various techniques in the field. It gives a firm background in this rapidly progressing field, which will permit utilization of new forms of transistors as they appear. In order to make the book applicable to as many of these devices as possible, the authors use a general treatment, built around generalized equivalent circuits which can be used to conveniently represent the great majority of transistors. Each chapter is as self-explanatory as possible.

ULTRA HIGH FREQUENCY PROPAGATION, *by Henry R. Reed and Carl M. Russell, published by John Wiley & Sons, Inc., 440 Fourth Ave., New York 16, N. Y. Price, $9.50.* An outgrowth of extensive experimental research carried on at the U. S. Naval Air Test Center, this book makes available the most recent information on new developments in the field of ultra high frequency radio wave propagation. Emphasized is the system approach, and the consideration of the performance of the installation as a whole. The book provides a fuller understanding of the relative meaning of such critical factors as reflection, divergence, diffraction, turbulence and directivity. It demonstrates the application of UHF propagation in devices such as radar, television, automobiles, trains and missiles. It shows the way to a closer approach to ideal installation practice, pointing up the problems of maintenance.



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As the picture shows, YA Radiators do time on the rock pile, too! As standard equipment on many of America's most rugged portable air compressors, these Yates-American Radiators and Intercoolers fill the important job of cooling both the hard-working engines and the air they compress. Yates-American builds quality radiators for motor trucks, industrial trucks, tractors, locomotives, power plants—offers products for every heat transfer use. Give us your requirement . . we'll show you how we can help you.

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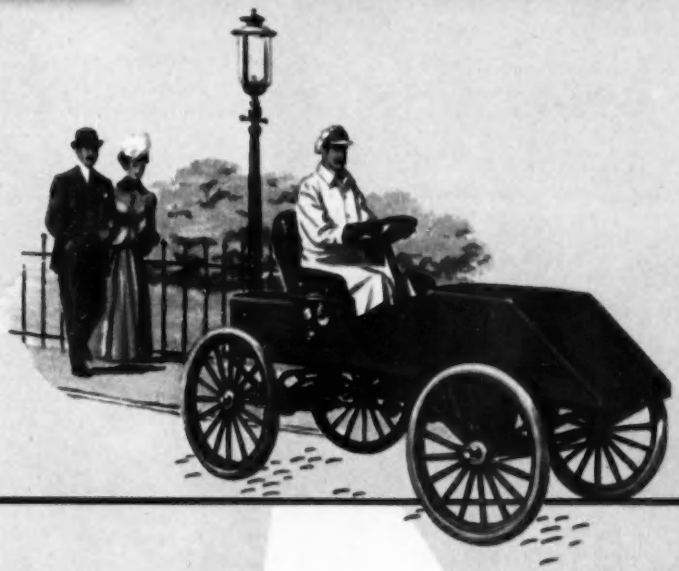


This is the Golden Year

First the boy; then the man.

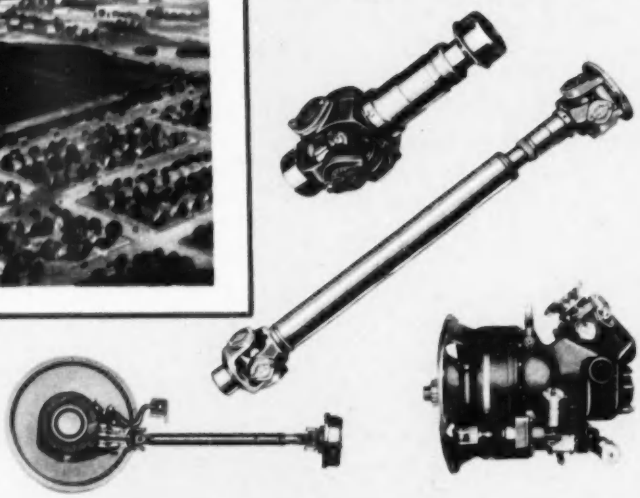
In 1904, Spicer was a new company, standing with hundreds of other companies on the threshold of America's brilliant automotive era.

In 1954, Spicer is an international economic force that has grown through 50 years of uninterrupted service to the great automotive industry.

This is the Golden Year for Spicer. This is the year for projecting new plans; the year for looking forward to new horizons; the year to start building for another 50 years of golden opportunities to grow and to serve.

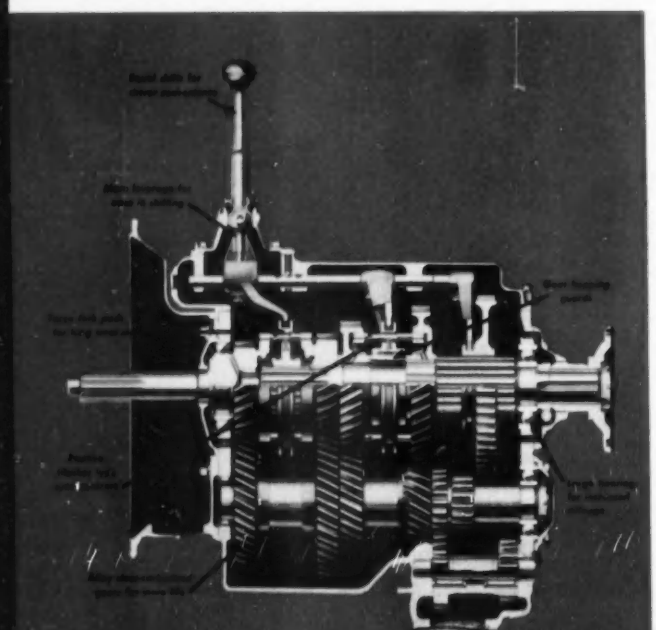
THIS IS SPICER IN TOLEDO, OHIO

Major products of the Toledo plant are the large sizes of the famous Spicer Universal Joints and Propeller Shafts, Transmissions, Railway Generator Drives, Torque Converters, and related materials



The Spicer Brown-Lipe Synchronized Transmission puts more productive horsepower

into driving wheels



Moving more tons at less cost per mile, with increased driver comfort and efficiency, are important functions being rendered daily in thousands of Spicer Fully Synchronized Transmission applications. Its advantages include:

Fully Synchronized in All Speeds above 1st	
Faster Shifts	No Missed Shifts
No Double Clutching	Less Driver Fatigue

This assures:

Faster Trips	Fuel Savings
Lower Upkeep	Increased Safety

SPICER MANUFACTURING DIVISION

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TRANSMISSIONS • UNIVERSAL JOINTS • PROPELLER SHAFTS • BROWN-LIPE and AUBURN CLUTCHES • FORGINGS • AXLES • STAMPINGS • SPICER BROWN-LIPE GEAR BOXES • PARISH FRAMES • TORQUE CONVERTERS • POWER TAKE-OFFS • POWER TAKE-OFF JOINTS • RAIL CAR DRIVES • RAILWAY GENERATOR DRIVES • AIRCRAFT GEARS • WELDED TUBING

50 YEARS OF Spicer SERVICE

ENGINEERING DANA MANUFACTURING

MEN *in the* NEWS

(*Continued from page* 25)

Dodge Div., Chrysler Corp.—The following division truck managers have been appointed: **Thomas A. Tingle**, Atlanta; **Eugene A. Rees**, Memphis; **Thomas D. Brislin**, Kansas City; **Ross M. Godshalk**, Chicago; **Frank A. Tiedge**, Detroit; **Herman H. Mesick**, New York; and **Thomas W. Nugent**, Dallas.

Trailmobile, Inc.—**Lawrence P. Haverkamp** has been promoted to budget director.

Hydra-Drives, Inc.—**W. A. Eskridge** has been placed in charge of industrial sales, and **P. R. Youngs** now heads automotive sales.

Dodge Div., Chrysler Corp.—**George A. Orphal** has been appointed metropolitan market coordinator for trucks.

Aeroquip Corp.—**Matthew J. Betley** is now vice-president and general manager.

Joseph T. Ryerson & Son, Inc.—**John W. Bodwell** has been made manager of the Work Order Dept., Chicago plant.

Lyon, Inc.—**Harry J. Eynon** is now assistant production manager.

A. O. Smith Corp.—**Charles E. Heitman** has been named assistant to the general manager.

Consolidated Vacuum Corp.—**J. Kneeland Nunan** has been elected president.

Gould-National Batteries, Inc.—**E. I. Whyatt** has become assistant to the president.

Magnecord, Inc.—**Otto C. Bixler** has been elected vice-president.

National Aero Sales Corp.—**O. B. Callan** has become sales manager.

Superior Coach Corp.—**Yale R. Schively** has been made national public relations consultant.

Clark Equipment Co.—**Clarence E. Killebrew** has been elected vice-president.

American Brake Shoe Co.—**W. Scott Fraula** has been made vice-president for labor relations and operations including engineering and maintenance.

Alloy Metal Wire Co.—**L. L. Garber** has been elected a director, vice-president, and general manager.

Got A Hard-To-Reach Place

WHERE YOU HAVE TO PUT A NUT?

use

MIDLAND
Welding Nuts

Midland Welding Nuts anchored* to parts in inaccessible places eliminate the need for holding them while attaching other parts.

*THIS IS ALL YOU DO—Just insert collar of Midland Welding Nut in hole for bolt or screw, resistance weld the Nut in place, and the Nut is there for the life of the job. Nuts can be automatically fed to the welder. Speed your production . . . save money,

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Manufacturers of

AUTOMOBILE AND TRUCK FRAMES | AIR AND VACUUM POWER BRAKES | AIR AND ELECTRO-PNEUMATIC DOOR CONTROLS

INDUSTRY *Previews and Reviews*

(*Continued from page* 53)

mary aluminum production for the year is estimated by the Aluminum Association at 2.5 billion lb, or about 33 per cent over the 1,874,664,367 lb produced in 1952. The 1953 production would have been still higher had it not been for a power shortage in the South which resulted in some loss of production in that area during the last quarter.

The industry's expansion program moved ahead on schedule during the year so that by year-end its annual primary capacity stood at approximately 2.84 billion lb, including about 158 million lb of stand-by capacity using high-cost power. New fabricating plant construction also was on schedule during the year. The third round of primary capacity expansion, however, which was announced late in 1952 and which would have brought three new producers into the industry has not materialized. This additional capacity still is under consideration by the Government and may be carried forward during the coming year.

The industry's increasing production eased the aluminum supply situation considerably in 1953. As a result, more metal has become available for civilian use than at any time since the outbreak of hostilities in Korea. Aluminum users may expect to find more metal available in 1954 over and above the additional metal to be taken for the national stockpile.

Shipments of aluminum products also showed large increases during 1953. Using statistics compiled by the U. S. Bureau of the Census for the first ten months of the year and adjusting for trends in the final months, 1953 shipments of wrought aluminum products are estimated at 2.32 billion lb or 20 per cent over the 1952 total. Shipments of aluminum sheet and plate during the year are estimated at 1.395 billion lb or 28 per cent over the 1952 shipments of these products. The estimate for extruded shapes, rod, bar, tube blooms and tube totals 445 million lb or 30 per cent above the 1952 figure; and for rolled structural shapes, rod, bar and wire, 425 million lb or four per cent under the 1952 total of these items.

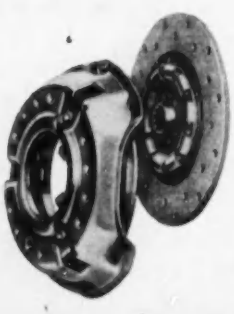
Shipments of aluminum castings estimated on the same basis as for wrought products totaled 650 million lb during the year or 25 per cent over the 1952 total of 518,979,000 lb. Of the three principal types of aluminum castings produced, die castings showed the greatest increase over 1952, an estimate of 235 million lb or 38 per cent over the previous year. Permanent-mold castings ran a close second in percentage increase with shipments estimated at 198 million lb or 35 per cent above 1952, while sand casting shipments are estimated at 213 million lb or nine per cent over the 1952 figure.

Following the pattern set by the steel and other industries, the aluminum industry granted another round of wage increases to its employes during the year. To cover these increases plus advances in the cost of raw materials required by the industry, price increases for aluminum and aluminum products became necessary in 1953. The present price of aluminum pig is 20 cents per lb and of ingot 21½ cents.

Several new alloys were introduced by the industry during the year. These included an aluminum-magne-

WHAT IS YOUR CLUTCH PROBLEM

There is no one stock answer to every power transmission control problem. That is why ROCKFORD clutch engineers can be of practical help in designing applications that will increase your product's efficiency — make substantial savings in cost — and reduce servicing downtime. Send a print or a description of your clutch need for their recommendations — based on many years of clutch application experience and the extensive ROCKFORD line of clutches, power take-offs and speed reducers.



Send for This Handy Bulletin

Shows typical installations of ROCKFORD CLUTCHES and POWER TAKE-OFFS. Contains diagrams of unique applications. Furnishes capacity tables, dimensions and complete specifications.

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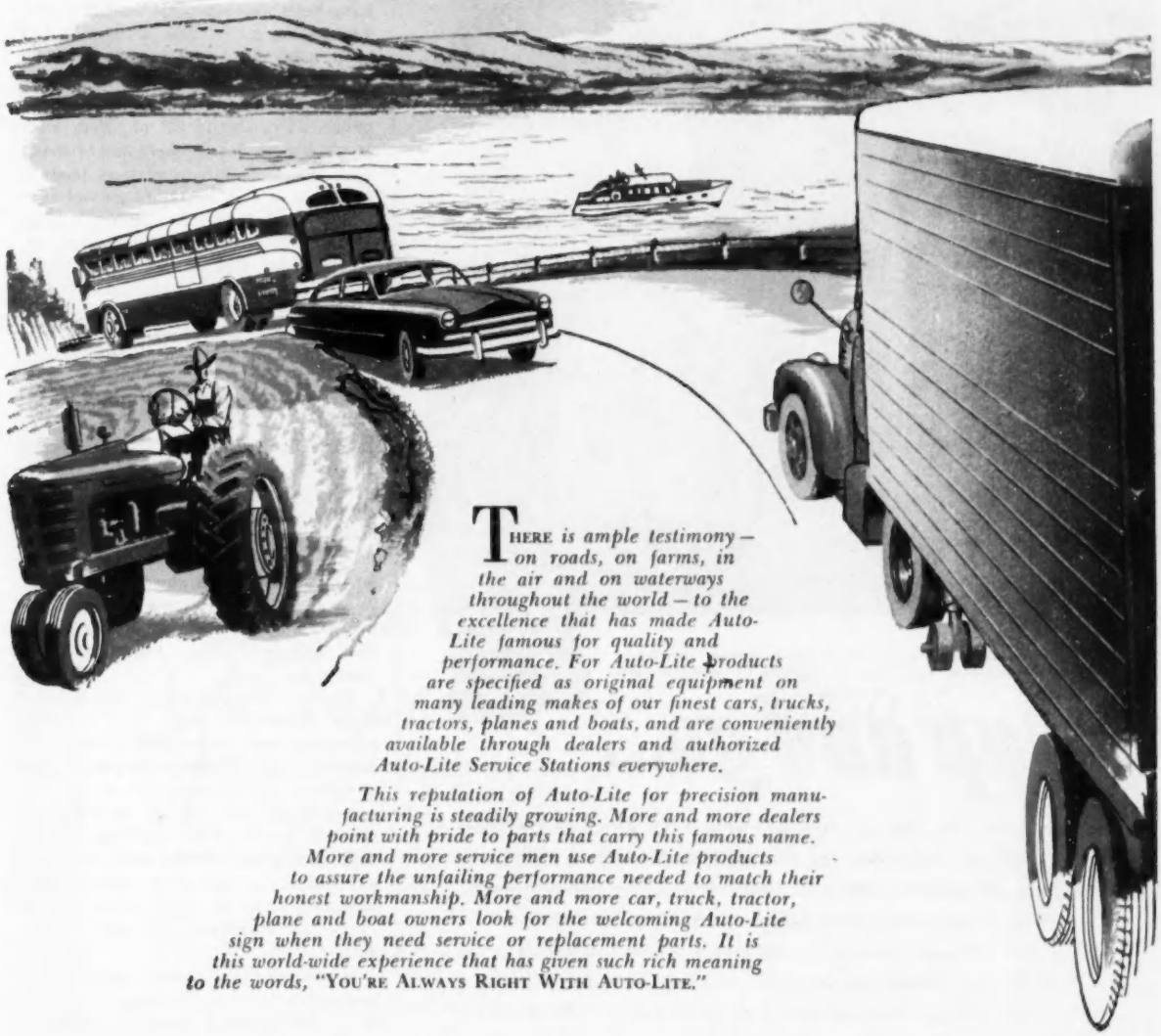
ROCKFORD CLUTCH DIVISION
Borg-Warner
313 Catherine St., Rockford, Illinois

ROCKFORD CLUTCHES

Serving the world's constant demand for better transportation!



THERE is ample testimony — on roads, on farms, in the air and on waterways throughout the world — to the excellence that has made Auto-Lite famous for quality and performance. For Auto-Lite products are specified as original equipment on many leading makes of our finest cars, trucks, tractors, planes and boats, and are conveniently available through dealers and authorized Auto-Lite Service Stations everywhere.

This reputation of Auto-Lite for precision manufacturing is steadily growing. More and more dealers point with pride to parts that carry this famous name. More and more service men use Auto-Lite products to assure the unfailing performance needed to match their honest workmanship. More and more car, truck, tractor, plane and boat owners look for the welcoming Auto-Lite sign when they need service or replacement parts. It is this world-wide experience that has given such rich meaning to the words, "YOU'RE ALWAYS RIGHT WITH AUTO-LITE."

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BATTERIES • BUMPERS • FUEL PUMPS • HORNS • GENERATORS
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WORLD'S LARGEST INDEPENDENT MANUFACTURER OF AUTOMOTIVE ELECTRICAL EQUIPMENT

TOWMOTORS IN ACTION IN U. S. INDUSTRY

Modern transportation demands the ultimate in materials handling. This Towmotor LT-60 is one of a fleet owned by the Flying Tiger Line.

Get up and go...

Towmotor has the "get up and go" you want to speed materials through each step of receiving, storage and production right into the carriers—even when you're short-handed! This "one-man-gang" lifts, carries, lowers and positions any load that can be *handled.*

If you like to break records, if your boss is economy-minded, you'll want all the new Towmotor features, including Towmotor Towmo-Torque Drive, Power Steering, and "Cushioned Power" Diesels. Send for free booklet, "What Makes It Tick?" TOWMOTOR CORPORATION, Div. 4501, 1226 East 152nd Street, Cleveland 10, Ohio.

TOWMOTOR
THE ONE-MAN-GANG

FORK LIFT TRUCKS and TRACTORS
Since 1919
TOWMOTOR ENGINEERED FOR QUALITY PERFORMANCE

sium sheet alloy for general metal working requirements having a nominal magnesium content of 0.9 per cent; and a new high-strength extrusion alloy developed primarily for aircraft applications and having an ultimate tensile strength of about 100,000 psi.

Perhaps the most notable trend in transportation equipment has been the increasing use of the metal in automobiles. Several manufacturers have built experimental models of advanced design in which aluminum has been used rather extensively. Most of these cars have bodies made partly of aluminum and some are all aluminum. Practically all of them have engines with large components made of aluminum. In production models, there is an increasing use of the metal in automatic transmissions, particularly those of the torque-converter type, and in decorative sheet metal and trim. There is also a trend toward an increasing use of aluminum die castings in this field.

TRANSPORTATION

One-Sixth of Nation's Investment

Over $57 billion was spent by the people of the United States for all kinds of transportation in 1953—to move goods and people by waterways, railroads, highways and airlines—and to transport petroleum products by pipe lines, according to the Transportation Association of America.

Public transportation has developed vigorously over the past 15 years and now represents about one-sixth of the Nation's corporate investment. It performs services valued at one-tenth of all the goods and services produced in America. It absorbs one-tenth of the total business expenditures for new plant and equipment and it employs one out of every 20 employed persons in the country.

In 1954 these great arteries of commerce include the basic facilities of 28,300 miles of inland waterways; 3,326,510 miles of streets and highways; 72,328 miles of airways; 5679 civil airports; 173,000 miles of petroleum pipe lines; and 223,427 miles of railroads.

Thousands of transport agencies operate over these basic facilities. Included are 130 larger railroads and 550 smaller lines—owning 2,083,356 freight cars, 41,201 passenger cars, and 42,473 locomotives; 89,313 airplanes, of which 1078 are operated by the larger scheduled airlines in do-

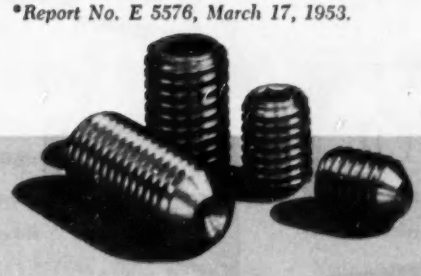
(*Turn to page* 158, *please*)

NEW *Allenpoint Set Screws*

WITH SCIENTIFICALLY-DESIGNED SMALLER CUP POINTS

Tested comparatively by United States Testing Company* with standard cup point screws and screws with angled and serrated points, the new Allenpoint demonstrated (1) greater locking power at *all* measured installation vs removal torque pressures, (2) uniformly high shaft holding power in torque resistance tests, (3) unmatched performance under vibration, and (4) more complete shaft contact pattern. Sold *only* by leading Industrial Distributors. Write us for more facts about the results of these important tests of set screw performance.

**Report No. E 5576, March 17, 1953.*

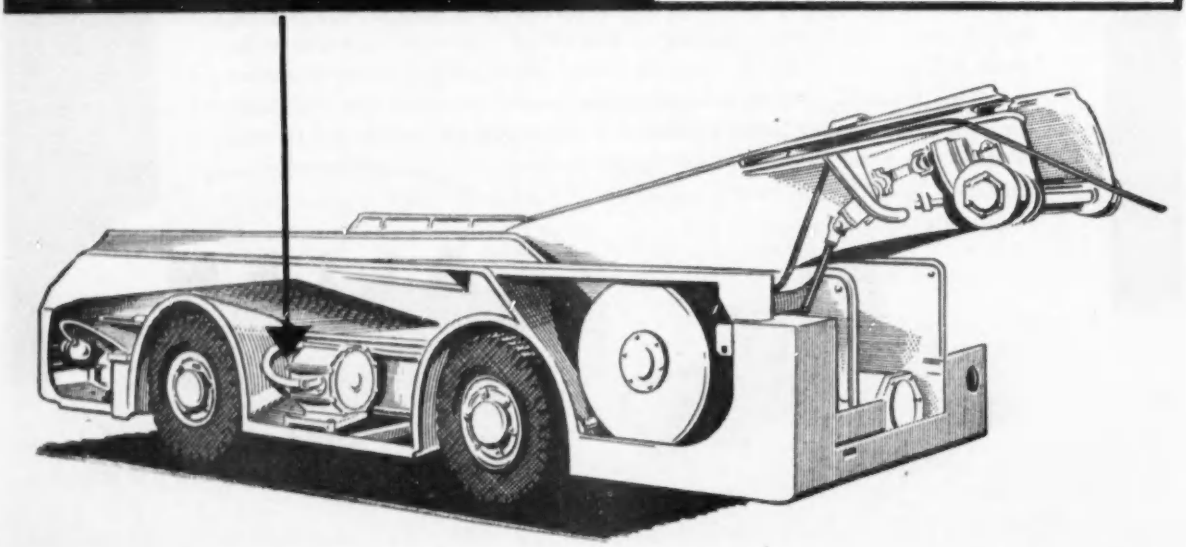


ALLEN
MANUFACTURING COMPANY
Hartford 2, Connecticut U.S.A.

ALLEN HEAD

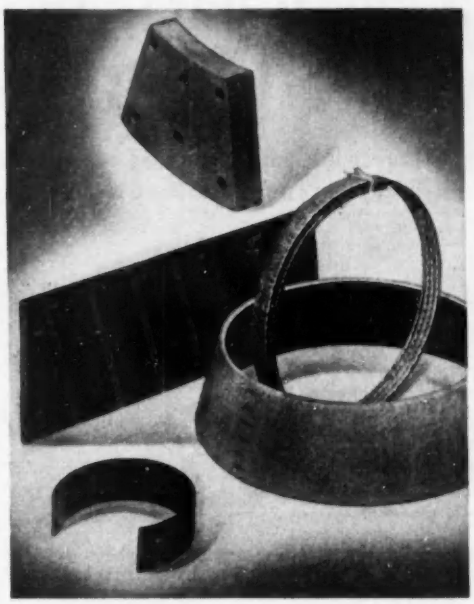
R/M

To give this cable reel shuttle-mine car reliable stopping power, R/M designed and made the sintered metal friction disc illustrated here. Two of these vitally important parts are employed on each of two disc brake assemblies. The performance they are rendering is outstanding.



THE TRADE-MARK THAT SPELLS PROGRESS IN FRICTION MATERIAL DEVELOPMENT!

The sintered metal brake part described on the opposite page typifies the hundreds of friction material products Raybestos-Manhattan has developed for specialized applications. Throughout industry in general R/M is recognized for its ability to solve tough design and manufacturing problems involving friction materials. If you have such a problem, remember that R/M has had a wealth of experience working with countless combinations of different types of friction materials . . . woven and molded asbestos, semi-metallic materials, and sintered metals . . . is constantly achieving outstanding results. Your problem could very well be one that R/M has already attacked and solved. In any case, you will find your R/M representative helpful. Call him in and get the advantage of working with a man who has the world's largest maker of friction materials behind him.



R/M's complete line of friction materials includes woven and molded asbestos parts in the form of blocks, segments, discs, cones, collars, and many special shapes.

Write for your copy of the R/M Engineering Bulletin. It describes and illustrates many R/M friction materials for aviation, agriculture, the automobile industry and others

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R M

(*Continued from page* 154)

mestic service; thousands of local, state, and interstate trucking companies with 9,460,000 trucks of all kinds; and 2847 bus companies.

John V. Lawrence, managing director of American Trucking Associations, Inc., states that the outlook for the trucking industry in 1954 is generally good, following a year of record-breaking advances in terms of equipment in operation, employment, and freight service performed. But the industry must anticipate serious problems arising out of the threatened breakdown of interstate reciprocity due to ton-mile and similar third structure taxes now being considered or already imposed by some state legislatures.

MATERIALS HANDLING EQUIPMENT

Annual Volume of $1¼ Billion

During 1953, shipments of material handling equipment increased over 1952, and top management gave handling more consideration, said Howard M. Palmer, president of The Material Handling Institute. Several mergers of equipment companies were announced and the shortage of trained man-power at all levels was a problem to both manufacturers and users although the several MHI activities are directed toward solution.

The industry's volume has reached $1¼ billion worth of material handling equipment—conveyors, pallets, steel strapping, hoists, cranes, monorail systems, skids, tote boxes, elevators, wheeled floor trucks, electric and gasoline-powered industrial trucks—which has reduced the costs of and made possible the more efficient production of $108 billion worth of manufactured goods plus the warehousing and distribution of these goods—about $1 of material handling equipment for each $100 of manufactured products.

Material handling as a well organized science of management has assumed a larger role in progressive industries. Top management is changing its attitude toward material handling because it now realizes the increased production and lowered costs that can be obtained by overall integration. Only a few years ago, material handling was the part-time responsibility of a busy production superintendent with limited access to top management. More and more, now we find the material handling function being exercised by a vice-president with a voice in top management decisions with full power and responsibility to integrate material handling with accounting, purchasing, warehousing, plant layout, tool design and maintenance.

A trend toward mergers of material handling equipment manufacturers characterized 1953. A manufacturer of electric trucks for inside work expanded the line to include gasoline powered vehicles and acquired another company to offer equipment for outside handling. Another industrial truck maker bought out a manufacturer of straddle-type equipment and a power shovel company. A conveyor manufacturer purchased a gasoline fork-lift truck company. Many other companies in the industry expanded production by building new plants or adding to existing ones.

Leasing and renting of material handling equipment became more widespread. Long-term financing of the outright purchase of equipment also had the effect of expanding the markets for equipment.

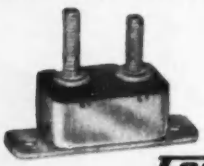
The increased use of electronics in

(*Turn to page* 161, *please*)

5 small parts to solve BIG PROBLEMS

Some of the smallest parts are big factors in helping a car earn and keep a good reputation.

FASCO
LOW PRESSURE INDICATING SWITCH
Dependable signal of dangerous low-pressure—as in engine lubricating or air brake systems.



FASCO
AUTOMATIC RESET CIRCUIT BREAKER
Precision calibrated—Permanent protection for electrical equipment —Instant mounting.

FASCO
DIRECTIONAL SIGNAL FLASHER
Compact—Rugged—Adaptable to all circuits—Safe—Economical (no fuse needed).

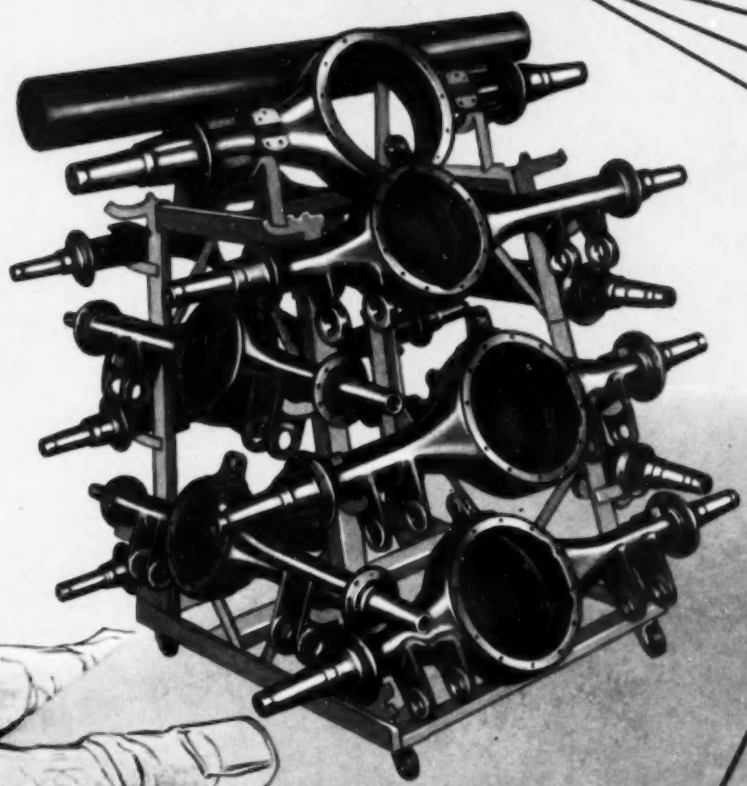
FASCO
HYDRAULIC STOPLIGHT SWITCH
Accurate—Extremely high safety factor—Proved through 26 years as standard original equipment.

FASCO
SERIES 400 PRESSURE SWITCH
Versatile (for low and medium pressure applications) — Reliable Available in many forms.

Fasco Electrical Equipment Serves the Automotive Industry

FASCO
INDUSTRIES, INC.
ROCHESTER 2, NEW YORK

It's Unique



THE CLARK AXLE HOUSING

LONG LIVED

Do you use PRECISION GEARS ? CLARK produces them ...MOST TYPES, MOST SIZES

An ideal answer to your problem?—Could be:
this unique one-piece forged heat-treated housing,
produced in a variety of designs and sizes.
You'll find it's "good business" to do business with Clark

CLARK EQUIPMENT

CLARK EQUIPMENT COMPANY • BUCHANAN • Battle Creek, Benton Harbor and Jackson, Michigan

"Clark Fork Trucks increased storage capacity one-third, cut car-unloading time by more than 50%"

SAYS **JOSEPH PALESE**, PLANT SUPERINTENDENT, SALERNO-MEGOWEN BISCUIT CO., CHICAGO

In this Salerno bakery, one of the world's largest, you find four Clark electric fork trucks and three Clark Powrworker hand trucks—unloading and storing raw materials and handling palletized cartons ready for shipment.

Practically all material received from local suppliers—bags of flour and sugar, drums of oil and shortening, other items in boxes, sacks, rolls—is loaded on pallets manufactured by Salerno, and furnished by them to suppliers. The busy Clarks take over at the receiving doors, and handle materials throughout the full production cycle. Benefits are substantial: a 33% increase in storage capacity and car-unloading time cut by well over 50 per cent.

"We are completely satisfied with our Clark machines, and have three more on order," says Mr. Palese.

These benefits can be yours—simply call your local Clark dealer, listed in the Yellow Pages of your phone book: a good man to help engineer a handling system to meet your needs.

Industrial Truck Division
CLARK EQUIPMENT COMPANY
BATTLE CREEK, MICHIGAN

CLARK EQUIPMENT

PRODUCTS OF CLARK—TRANSMISSIONS • AXLE HOUSINGS • TRACTOR UNITS FORK TRUCKS and TOWING TRACTORS • ROSS CARRIERS • POWRWORKER HAND TRUCKS • POWER SHOVELS • ELECTRIC STEEL CASTINGS • GEARS and FORGINGS • FRONT and REAR AXLES for TRUCKS and BUSES

(*Continued from page* 158)

the control of conveyors, pallet loaders, packaging equipment became more general, pointing the way toward more complete automation at some future date.

One of the needs for the future of both manufacturers and users of material handling equipment will be trained man-power on all levels. In the next few years users will have to find many thousand more qualified men to operate new industrial trucks alone. More will be required to supervise, service, maintain and repair just this one type of equipment. Manufacturers will need more trained engineers than are now available to design, build and sell the tools of material handling.

Rubber Road Reported Successful in Test

Results of test installations of roads surfaced with a special rubber compound indicate satisfactory improvements over conventional paving materials, according to Rubarite, Inc., producer of the road surfacing material.

The company, owned jointly by Goodyear, National Lead Co., and Bird & Son, Inc., reports that the rubber test roads show evidence of excellent ability to withstand changing weather conditions; greater durability and longer wear under heavy traffic conditions; more resistance to stripping, oxidation and bleeding, and lower maintenance costs.

The surfacing material, called Rubarite, is a free-flowing powder consisting of unvulcanized rubber and barytes mineral. The finely divided mineral serves as a carrying agent for the rubber particles. It provides for a high degree of dispersion and also has a high affinity for asphalt, making for a smoother blending. The material now is being produced in a plant at Magnet Cove, Ark.

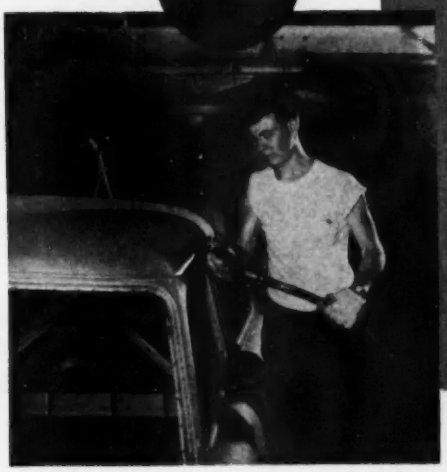
Twin Coach to Produce More Aircraft Parts

The Buffalo Div. of Twin Coach Co. is tooling for production of components for two types of planes.

Center panels and wings for the Grumman S-2F and large components for the B-52.

Although the amounts of the new contracts were not disclosed, the plant now has over $50 million worth of contracts. It had shipped about $25 million worth of plane parts at the end of 1953.

HOW PRESSTITE PLASTIC SEALERS Seal in The Quality of Automobile Bodies



Applying Presstite plastic sealer with flow gun to drip rail seam where it joins roof panel

To effectively seal exterior seams in automobile bodies, extremely tough sealing compounds with high resistance to weathering and corrosion are required. Plastic sealers of the heat curing type were specially developed by Presstite to meet this need.

Designed to have controlled flow characteristics, plastic sealers range from a relatively thin liquid consistency for use where flow is desired, to a thick paste which remains in position as applied.

They form a tough, cohesive, non-shrinking, rubber-like seal with excellent adhesion after being subjected to heat in the paint baking ovens for the required length of time and degree of temperature.

Blowing type plastic sealers can be furnished where a cushioned effect is required.

Before evaluating a plastic sealer for a particular job, it is recommended you consult a Presstite engineer because paint baking cycles vary so greatly from plant to plant. Such a meeting can be arranged at your request and convenience.

Application of Presstite plastic sealer to top of plenum chamber. After curing in baking ovens, material prevents instrument panel squeaks.

PRESSTITE SEALING COMPOUNDS

In Canada: Railway and Power Engineering Corp., Ltd.

PRESSTITE ENGINEERING COMPANY

3760 Choteau Ave. • St. Louis 10, Mo.

Structural Plastics for Advanced Types of Aircraft

(*Continued from page* 51)

at proportional limit. The initial values can be changed considerably after repeat loadings or preloading. A small number of preloads have no appreciable effect on the strength of the laminate. The application of many repeated loadings, however, may result in a fatigue failure with strength much lower than the static strength. Fig. 6 shows typical tensile stress-strain curves for glass fabric 181—polyester resin laminate, the first specimen being preloaded to a stress between the initial and secondary proportional limits and the second being loaded at a stress between the secondary proportional limit and ultimate strength. In general, this double straight line condition changes after the tensile specimen is stressed beyond its initial proportional limit. The tensile modulus of elasticity after preloading is intermediate between the initial and secondary moduli determined from the first loading. The ratio of the final modulus to the secondary modulus varies with the magnitude of the preload. With an increase in the preload, the final modulus approaches the secondary modulus.

Illustrated above is a cycle tester in which thermostats are alternately subjected to hot and cold baths which serve to open and close the thermostats. By counting these open and close cycles, Flexonics Corporation is able to determine the expected life of a Flexon Thermostat.

This is just one of the many quality control procedures performed at Flexonics to be sure Flexon Thermostats exceed your requirements—further proof that when you specify Flexon Thermostats, you specify more than just a "stat". You are assuring yourself of experienced and painstaking manufacture . . . assuring yourself of a thermostat that has been proved *before* the car buyer gets it.

We'd like to talk thermostats with you. Write, wire or phone.

Flexonics *Corporation* 1396 S. THIRD AVENUE • MAYWOOD, ILLINOIS

FORMERLY CHICAGO METAL HOSE CORPORATION

Flexon identifies products of Flexonics Corporation that have served industry for over 22 years

Manufacturers of thermostats and flexible metal tubing. Plants at Maywood, Elgin, Rock Falls and Savanna, Ill. and Memphis, Tenn. In Canada: Flexonics Corporation of Canada, Ltd., Brampton, Ontario

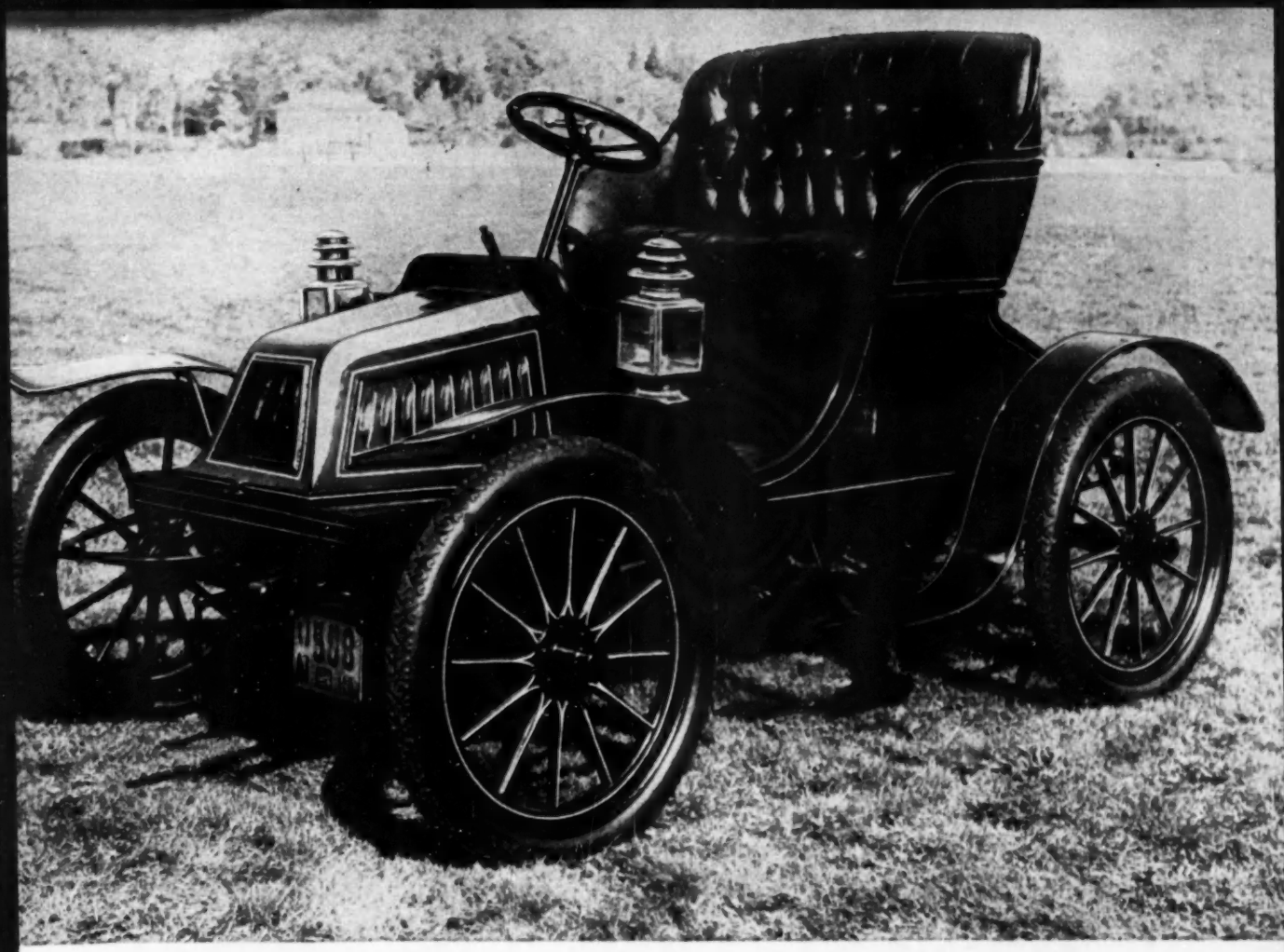
Variables

Filler—Finely divided inert and inorganic fillers are sometimes added to glass fiber plastic resin laminates, usually for such purposes as lowering cost, improving mold release, provide better finished surfaces, and to make resin tacky. When using glass fiber mat and commercially available polyester resins certain fillers (such as calcium carbonates), up to approximately 60 per cent by weight of the resin can be used without materially affecting the mechanical properties of the laminates. However, flexural strength can be decreased by as much as 30 per cent when using 10 to 15 per cent filler in a conventional laminate.

Voids—Air or gas bubbles minute in size may occur in glass fabric polyester resin laminates. The amount of voids is related to the effort expended in working them out prior to curing resin, temperature cure cycle used, and other details used during the laminating procedure. Typical void free (or low percentage of voids) laminates using polyester resin conforming to Specification MIL-P-8013(USAF) are extremely translucent. The percentage of voids can be estimated on the basis of laminate, resin and glass weights. Laminates having a high percentage of voids (above 3 to 5 per cent voids by volume) tend to have lower strength, poorer rain erosion resistance, higher moisture pick up, and severely affect the electrical properties.

Curing Pressure—When curing polyester type laminates between zero to 50 psi, it has been found that optimum strength properties are obtained when cured between 30 to 50 psi in either a closed or open mold. In the case of phenolic type laminates curing pressures in the range of 160 to 200 psi produce higher strengths, particularly at high temperature.

Moisture—Typical of many other materials moisture has a detrimental



Send for free print

Pope-Tribune, most successful of five makes produced by the Pope Manufacturing Co. of Hartford, Conn., had comparatively advanced engineering for its era. This 1904 runabout featured a vertical one-cylinder water-cooled 6 hp. engine, leather-faced cone clutch, ¾-elliptic front and rear springs, clutch and differential brakes.

This is one of a series of antique automobile prints that will appear in future Morse advertisements. Write for your free copy, suitable for framing.

Experience suggests that you, too, can benefit from this equation:

M=TC

Morse *means* Timing Chains

The traceable, specific savings many automotive manufacturers experience with Morse Timing Chain Drives . . . the advantages that have made M=TC an automotive *byword* . . . can quite easily be yours, too.

Let's talk cases: Morse Timing Chain Drives maintain positive, accurate timing despite shaft end-play . . . assure safe, quiet performance even when camshafts and crankshafts are not exactly parallel . . . give you production savings by permitting greater engine block tolerances, vastly increased ease and speed of assembly.

Your engineers will welcome the problem-cracking help of Morse design, development, and application specialists.

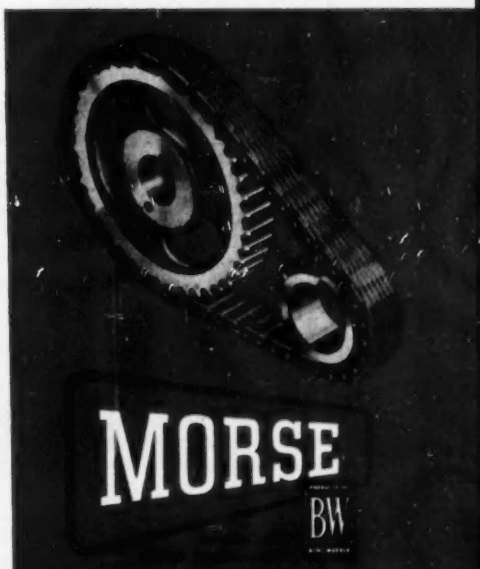
Your production control men will appreciate Morse's customer-conscious, on-schedule delivery.

M=TC is a working equation for *eleven* of the thirteen auto makers now using timing-chain drives . . . who use dependable Morse Timing Chain Drives as original equipment.

Call or write us for further information about *your* timing-chain ideas or problems. You'll shortly see *why* M=TC; Morse *means* Timing Chains . . . and *how* this will benefit you.

MORSE CHAIN COMPANY

7601 Central Avenue • Detroit 10, Michigan



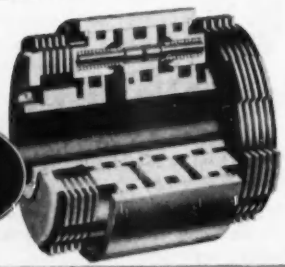
Giddings & Lewis Standardizes on . . .

New Twin Disc Oil-Actuated Multiple Plate Clutches!

For *more constant* torque . . . *longer* wear life . . . *higher* capacity for size . . . *elimination* of adjustment . . . and remote control at *less cost* . . . Giddings & Lewis have standardized on the new Twin Disc Oil-Actuated Multiple Plate Clutch for their "50 Series" Horizontal Boring, Drilling and Milling Machine. Giddings & Lewis—who worked closely with Twin Disc on pilot installations—will utilize two Model MOD (duplex) and four Model MOS (single) Clutches on their "50 Series."

Write to Twin Disc for information on how this all-new Oil-Actuated Multiple Plate Clutch might be applied to *your* machines.

Below, new Model MOD (duplex) Oil-Actuated Multiple Plate Clutch provides consistently longer wear life. Floating or pressure plate is ram of cylinder. As stack wears, ram travel increases automatically.



TWIN DISC
CLUTCHES AND HYDRAULIC DRIVES

TWIN DISC

TWIN DISC CLUTCH COMPANY, Racine, Wisconsin • HYDRAULIC DIVISION, Rockford, Illinois

BRANCHES: CLEVELAND • DALLAS • DETROIT • LOS ANGELES • NEWARK • NEW ORLEANS • SEATTLE • TULSA

effect on laminates. New finishes have been developed which result in only slight reduction in strength with maximum loss of about 10 per cent. These finishes are presently available in production.

Rain Erosion—To date no structural plastic has been developed which will sufficiently withstand erosion due to high speed flight through rain. However, thin sprayable or brushable air drying rubber coatings conforming to specification MIL-C-7439 are available which are considered satisfactory on these housings.

The foregoing is an abstract of a paper presented by Mr. Rosato at the 1953 Annual Meeting of the American Society of Mechanical Engineers.

Stratos Div. Produces Novel X-3 Cooling Unit

An evaporative refrigeration system, which takes advantage of the fact that the boiling point of water is lower at altitude, has been built for the X-3 research airplane by Stratos Div. of Fairchild Engine and Airplane Corp. The unique system combines an air cycle refrigeration system with a water evaporator and conventional air-to-air heat exchangers to create a reliable system of light-weight but high capacity.

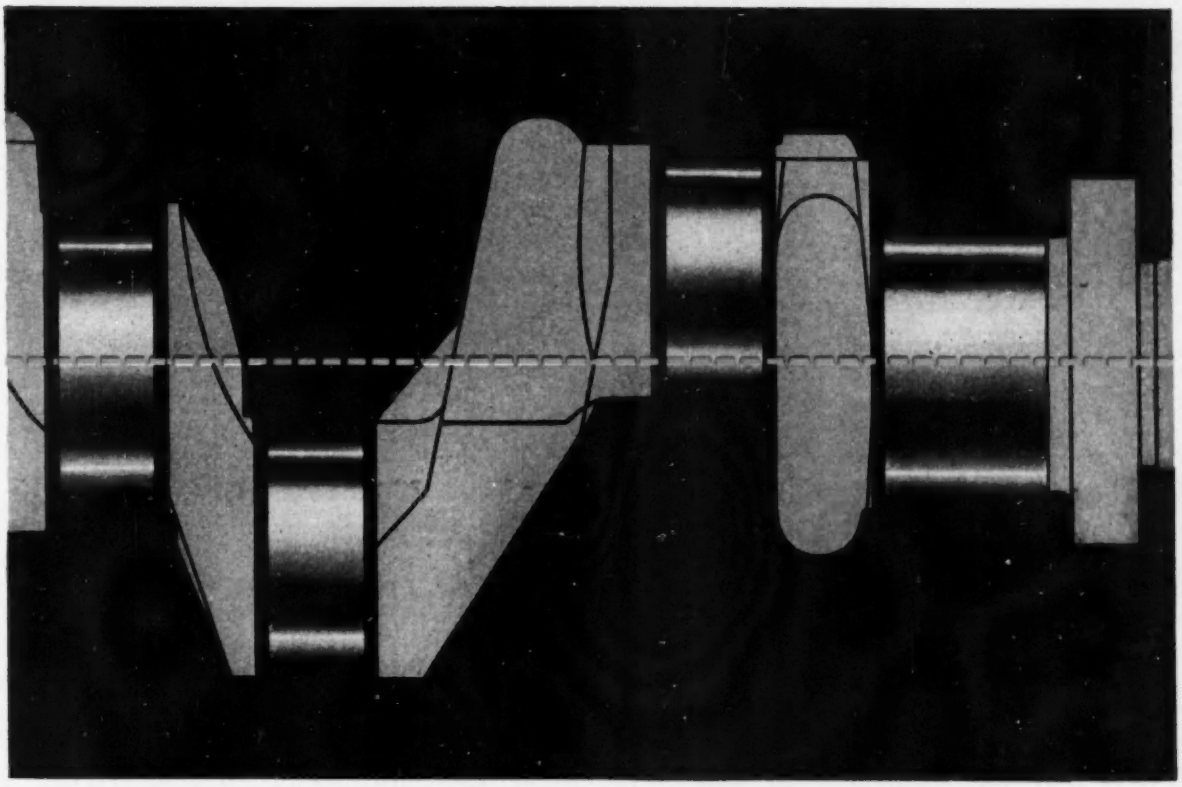
The X-3 uses air bled from its jet engines for pressurization and cooling. The bleed air first is passed through a ram air heat exchanger and a blower heat exchanger which form part of the system.

The cabin air next is passed through a "boiler"—an open cycle evaporative cooler—where it boils away water at temperatures substantially below water's sea-level boiling point, and well below the effective temperature of the air immediately surrounding the aircraft. The temperature is further reduced in an air cycle refrigeration turbine before entering the cockpit.

Aircraft Plant in Mexico Contemplated This Year

In a move to develop Mexican civil aviation, the Department of Communications is studying plans to "sponsor" an airplane assembly plant so that appropriate equipment can be assembled within the Republic. No official word has been given out, but it is learned from excellent sources that plans for the plant will go forward this year. Until now Mexico has been importing all aircraft used on national lines.

The crankshaft is STRONGER



The bearings last LONGER

moraine 400

Because Moraine-400 is the toughest automotive engine bearing ever made —often many times as durable as conventional bearings—bearing length ceases to be a limiting factor in engine design. In many cases, bearing lengths have been reduced appreciably, thereby providing additional space for increasing the strength and rigidity of the crankshaft, yet due to the inherent qualities of the Moraine-400 the bearings last longer. This means that engineers can increase the compression ratio and the displacement of a given engine without increasing crankshaft length. The extraordinary toughness and durability of the Moraine-400 is due to its steel-backed aluminum-base alloy, developed by General Motors-Moraine research over a ten-year period. The bearings operate satisfactorily on oil-hardened and Tocco-hardened shafts, and they are outstanding in such characteristics as embedability, conformability, and resistance to corrosion. Tested in a heavy-duty truck engine, a set of Moraine-400's outlasted three cylinder blocks and three crankshafts.

moraine products
DIVISION OF GENERAL MOTORS CORPORATION, DAYTON, OHIO

Industry News

(*Continued from page* 80)

High Car Output in 1954 Is Expected by Canada

Canadian automobile makers expect 1954 to provide keener competition for the sale of new cars, but do not expect a cut in Canadian new car production from the record 460,000 expected for 1953. This view was expressed recently by Canadian spokesmen in mid-November following reports of a cutback in U. S. production in 1954.

The industry representatives felt that, in view of Canada's rising population and income, there will be no serious trouble in absorbing the same production as last year. They also pointed out that only one in every six Canadians now owns a car. Despite the entry of 1954 models on the Canadian market, there has been no glut of either 1953 or 1954 models.

JOHNSON

Tappets

"fill the exacting requirements of today's engines"

Higher horsepower and higher compression put heavier loads on the tappets. Johnson quality assures you the performance you want from these vital engine parts.

"Tappets are our business"

JOHNSON Jp PRODUCTS INC.

MUSKEGON, MICHIGAN

GE, Westinghouse See Good Year in 1954

The two largest electrical manufacturing companies in the U. S. have both predicted that 1954 will be a good year. According to Ralph J. Cordiner, president, sales of General Electric Co. are expected to remain unchanged during the next 12 months, at somewhere over the $3 billion mark. He went on to say that the company's civilian business next year would be up at least five per cent, although a decline in defense work is anticipated because of Government stretch-out policies.

Gwilym A. Price, president of Westinghouse Electric Corp., painted an even rosier picture. He predicted flatly that Westinghouse sales would exceed the expected 1953 total of $1.6 billion.

Dominion Gasket Expands

Dominion Gasket and Manufacturing Co., Ltd., Toronto, Canada, is erecting an extension to its present premises, bringing the total factory area to 65,000 sq ft. The company, which produces a wide range of gaskets and cork products, will use the new space mainly for the manufacture of plastic extrusions.

New Smith Plant

Smith Brothers Motor Bodies, Toronto, Canada, has arranged for the erection of a new plant with 32,000 sq ft of floor space on a three-acre site. The company, originally established as a carriage works, is now engaged in the building of specialized truck bodies.

International Buys Ohio Plant Site

International Harvester Co. has acquired a 537-acre site north of Springfield, O., but has not indicated to what purpose the property will be put. There is some speculation that Harvester may build a new factory for production of motor trucks, although the company said there is no present plan to move the Springfield plant outside the city.

Clark Dealers in East to Handle Ross Line

Clark Equipment Co. has revamped its dealer organization in the east to handle its newly-acquired Ross straddle carriers and fork truck lines. Under the new plan, Clark dealers will add Ross products to their regular sales and service activities.

(*Turn to page* 168, *please*)

All about the new

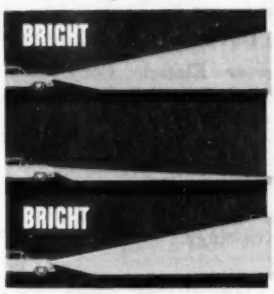
AUTRONIC-EYE®

AUTOMATIC HEADLIGHT CONTROL

ANOTHER GM ENGINEERING **FIRST**

What is it?

The Autronic-Eye is a modern electronic device that automatically controls automobile headlight operation at night. Developed by the Guide Lamp Division of General Motors after many years of electronic research, the Autronic-Eye provides the first completely satisfactory answer to the long standing need for a fully automatic headlight control.



What does it do?

The Autronic-Eye *automatically* dims your headlights when an oncoming car approaches. It holds your headlights at dim until all oncoming traffic has passed. Then the Autronic-Eye brings your lights back to bright—*automatically*.

Where is it located?

In four places—because the Autronic-Eye consists of four major units. (1) *Phototube Unit*, which is mounted on the top left side of instrument panel and aimed through the windshield. (2) "*Autronic Brain*," or amplifier unit, mounted under the hood. (3) *Power Relay Unit*, also mounted under the hood. (4) *Auxiliary Foot Switch*, located on floorboard just above standard dimmer switch.

How does it work?

When beams from approaching headlights strike the Phototube Unit, it picks them up and instantly transmits an electronic signal to the Amplifier Unit. This electronic "brain" operates the Power Relay Unit, which then switches the headlights from bright to dim. After all oncoming cars have passed, the electronic "brain" switches headlights back to bright. When the headlights are on dim, the Auxiliary Foot Switch permits the driver to flash his bright lights as a signal, or obtain additional light when needed.

Does it dim at the correct distance?

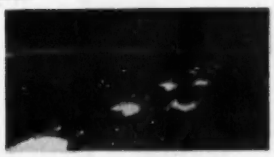
The Autronic-Eye dims headlights at a scientifically correct, uniform distance from the oncoming car. On hilly roads and on curves, the distance varies—but the Autronic-Eye always dims at *precisely the right second for safety!*

How does it make driving safer?

With the Autronic-Eye, headlights are always dimmed before the driver of an oncoming car comes within "dazzling range." Moreover, when the oncoming driver sees the lights of the Autronic-Eye-equipped car dim, he is reminded to dim his own lights in time.

How does it make driving easier?

The Autronic-Eye takes the driver's foot off the floor switch, his mind off the bothersome job of adjusting headlights. It relieves him of the nervous strain of night driving . . . lets him relax and enjoy the trip.

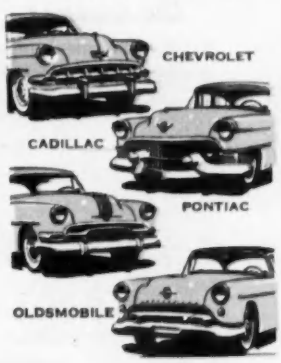


Has it been proved in use?

Already, *more than 300,000 drivers* are enjoying cars made safer at night with the new Autronic-Eye automatic headlight control. Its safe, efficient operation has been proved over two years—and many million miles—of night driving.

Where is the Autronic-Eye sold?

The Autronic-Eye is featured on the brilliant new Cadillac, Oldsmobile, Pontiac and Chevrolet models. See one of these dealers for a demonstration.



Guide
FOR SAFER DRIVING

®Trademark Registered U.S. Pat. Off.

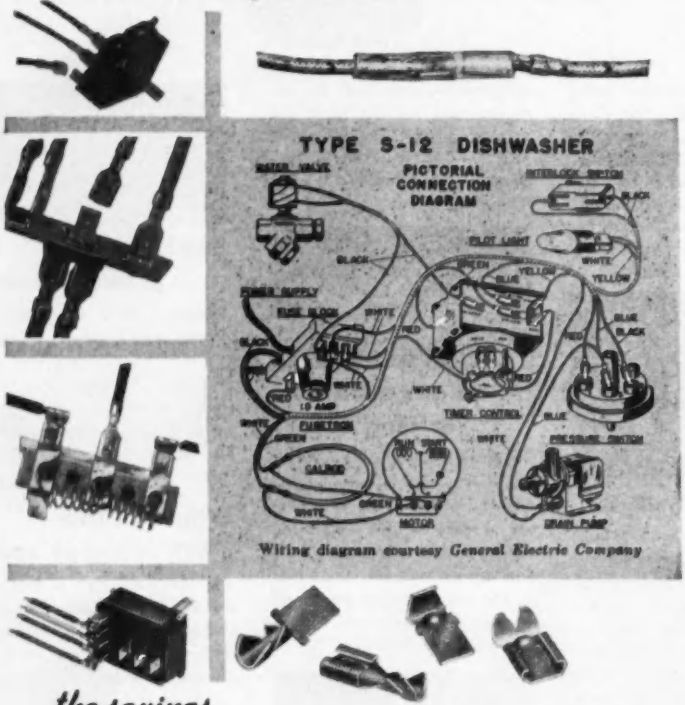
GUIDE LAMP DIVISION • GENERAL MOTORS CORPORATION • ANDERSON, INDIANA

this ARK-LES *idea*

Is saving millions in the electrical appliance and automotive industries.

the idea

Back in 1937, the Ark-Les Switch Corporation pioneered the development of a low-cost, fast-assembly, mechanically secure method of wiring electrical systems. The result was the Ark-Les QUICK-CONNECT terminal—first patented in 1943.



Wiring diagram courtesy *General Electric Company*

the savings

Production men report Ark-Les QUICK-CONNECT terminals cut wiring time up to 60% in assembling ranges, refrigerators, water heaters, panel boards, and all kinds of electric and automotive apparatus. Your own time-study figures will prove the savings realized in eliminating screw connections in the General Electric dish washer diagrammed above.

acceptance

of this money-saving idea is proved by the fact that "QUICK-CONNECT"—in various spellings—is now the standard term for the fastest wiring method. Manufacturers all over the country now incorporate these simple, safe, economical connections in their products—some under license from Ark-Les, and some in frank and successful imitation.

The engineering imagination that originated the "QUICK-CONNECT" terminal can cut your wiring costs. For details, write to the originators . . .

ARK-LES SWITCH CORP.
51 Water St., Watertown 72, Mass.

Industry News

(*Continued from page* 166)

General Tire to Issue New Preferred Stock

Shareholders of General Tire & Rubber Co. have authorized an amendment to the company's charter permitting the issuance by the board of directors of a new class of preferred stock in the amount of $35 million. The authorization was for the setting up of a new class of 350,000 preferred shares at a par value of $100 per share.

1953 Sales, Earnings Increase for Reliance

Shipments of $36,768,976 have been reported by Reliance Electric and Engineering Co. for the fiscal year ended Oct. 31, 1953. Net earnings for the year, after taxes, were $1,832,778. Comparative 1952 figures were net earnings of $1,816,140 on net sales of $38,564,437. Federal taxes, including $800,000 of excess profits tax, amounted to $3.640 million.

Westinghouse to Construct Metals Development Plant

Westinghouse Electric Corp. has announced that it will build a new metals development plant at Blairsville, Pa. Scheduled for completion by late 1955, the new plant will be devoted to metallurgical development and pilot production of special alloys and special castings.

Dow Vinyltoluene Plant Now in Full Production

Dow Chemical Co. has announced that its plant for the manufacture of vinyltoluene has been completed and is now in full production at Midland, Mich. The new monomer, similar to styrene in chemical behavior, is expected to contribute improved products in the fields of synthetic rubber, paint vehicles, rubber reinforcing resins and polyester resins. At present, the foremost use of vinyltoluene appears to be in the paint industry.

New Company Publication

Magnaflux Corp. has announced publication of a new magazine called "Magnafacts." It will be devoted to a variety of industrial case histories showing the role of Magnaflux inspection devices in detecting the defects that cause needless, costly and dangerous failures of parts and equipment.

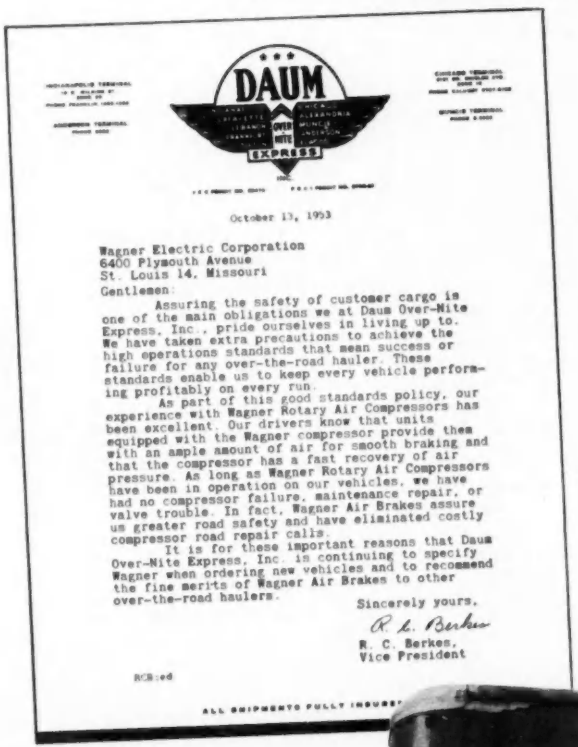
(*Turn to page* 173, *please*)

"Wagner Air Brakes

. . . assure us greater road safety and have eliminated costly compressor road repair calls."

says: **R. C. BERKES,** *Vice President*

Daum Over-Nite Express, Inc., Chicago, Ill.



DAUM

EXPRESS

October 13, 1953

Wagner Electric Corporation
6400 Plymouth Avenue
St. Louis 14, Missouri

Gentlemen:

Assuring the safety of customer cargo is one of the main obligations we at Daum Over-Nite Express, Inc., pride ourselves in living up to. We have taken extra precautions to achieve the high operations standards that mean success or failure for any over-the-road hauler. These standards enable us to keep every vehicle performing profitably on every run.

As part of this good standards policy, our experience with Wagner Rotary Air Compressors has been excellent. Our drivers know that units equipped with the Wagner compressor provide them with an ample amount of air for smooth braking and that the compressor has a fast recovery of air pressure. As long as Wagner Rotary Air Compressors have been in operation on our vehicles, we have had no compressor failure, maintenance repair, or valve trouble. In fact, Wagner Air Brakes assure us greater road safety and have eliminated costly compressor road repair calls.

It is for these important reasons that Daum Over-Nite Express, Inc. is continuing to specify Wagner when ordering new vehicles and to recommend the fine merits of Wagner Air Brakes to other over-the-road haulers.

Sincerely yours,

R. C. Berkes

R. C. Berkes,
Vice President

RCB:ed

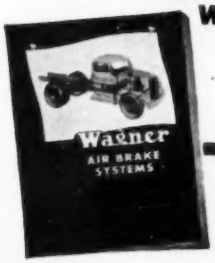
ALL SHIPMENTS FULLY INSURED

An ever-increasing number of fleets, like Daum Over-Nite Express, Inc., are getting added safety and service from Wagner Rotary Air Compressors . . . standard on all Wagner Air Brake Systems. All of these outstanding companies have proven to themselves that Wagner Rotary Air Compressors materially reduce costly down time for shop repairs, are easy to install, and guarantee drivers reliable, safe-sure stopping power.

The excellent-rated dependability of Wagner Air Brake Systems is backed-up by over twenty-six years of experience in manufacturing brakes and complete brake systems. Valuable engineering skill and development add to the many features you gain when you install Wagner Air Brakes. For example, there's no carbon formation in air lines because the oil is separated and cooled before the air is discharged from the Wagner Rotary Air Compressor. Rotary motion maintains uniform torque load. High volumetric efficiency assures fast air recovery. Preventive maintenance is easy and infrequent.

It will pay you to include Wagner Air Brakes as standard equipment on the vehicles you manufacture. Our engineering department will be glad to work with you and make recommendation as to the particular Wagner Air Brake System that will give your vehicles top braking efficiency. Complete data on Wagner Air Brake Systems is contained in Bulletin KU-201. Send for your copy today. No obligation.

WAGNER AIR BRAKE USERS ARE OUR BIGGEST BOOSTERS



Wagner Electric Corporation

6363 PLYMOUTH AVE., ST. LOUIS 14, MO., U. S. A.
(Branches in Principal Cities in U. S. and in Canada)

LOCKHEED HYDRAULIC BRAKE PARTS and FLUID . . . HoRoL . . . CoMaX BRAKE LINING . . . AIR BRAKES . . . TACHOGRAPHS . . . ELECTRIC MOTORS . . . TRANSFORMERS . . . INDUSTRIAL BRAKES

How C.P.C.*
CLEARING

Can Help Boost Your Productivity

As every manufacturer knows, the one way to beat today's profit squeeze—and tomorrow's—is to make each man-hour of labor, each unit of area, each dollar of investment, more productive. It's not a matter of whip-cracking. It is simply a matter of planning, based on accurate, up-to-date knowledge and experience.

Very often that planning involves a basic change in method. For example, many Clearing presses today are making parts which were formerly cast or machined from solid. Modern press methods are pointing the way to important savings in the manufacture of heavy section parts—substantial savings in man-hours and material as well, since press methods utilize practically all of the original metal.

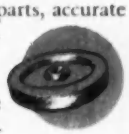
Clearing presses are everywhere recognized as important elements in the battle for greater productive efficiency. Clearing Machine Corporation has accumulated a central store of information, of know-how, to help any industrial concern, large or small, *attain more output per dollar.* That is the objective of C.P.C. — *Clearing Productivity Consultation.

This service is available to you without obligation. If you make large quantities of anything out of metal, you can profit from a Clearing Productivity Consultation.

For a Better Profit Position Tomorrow — Put Your Problem up to C.P.C.* Today

*Clearing Productivity Consultants have years of experience in their specific fields of press metalworking. If you plan to produce deep drawn parts, for example, a C.P.C. engineer can show you how the performance of a Clearing double action press can step up production to give you more than half again the output expected from conventional equipment. The problems presented by blanking and forming operations have been dealt with by these men in literally hundreds of installations throughout the country.

There is a C.P.C. to work with you on matters of closed die forgings — to discuss methods which can substantially reduce labor costs, and to go into details of temperature and physicals too. In the relatively new field of press extrusions, Clearing consultants can help you plan to produce heavy section parts, accurate to dimension, that can eliminate or materially reduce finish machining operations.



Improved Clearing hydraulic systems have simplified maintenance and operation. Increased efficiency in feeding—simplification of the die problem with rubber pad forming—are matters Clearing consultants regularly deal with. New methods of combining operations with transfer feed presses may be the way to cut labor and equipment costs. A Clearing Productivity Consultant in this field, as in all the others, is ready to help you plan today for a stronger profit position tomorrow.

CLEARING PRESSES

THE WAY TO EFFICIENT MASS PRODUCTION

CLEARING MACHINE CORPORATION ★ 6496 West 65th Street, Chicago 38, Illinois ★ HAMILTON DIVISION, Hamilton, Ohio

New SKF Bulletin Shows you how to get Spherical Roller Bearing capacity Up 25% to 50% life increased 2 to 3½ times...

Here, in a handy 12-page SKF Bulletin, is the information you need to take advantage of an SKF design improvement which

1. **Increases spherical roller bearing capacity 25% to 50%.**
2. **Increases service life 2 to 3½ times.**
3. **Carries heavier combined radial and thrust loads, or pure thrust loads of greater magnitude.**
4. **Is fully self-aligning.**

SKF *originated* the spherical roller bearing; now, again, the same pioneering kind of engineering provides industry with another important anti-friction first. This latest advance has been thoroughly proved over an extensive period in such applications as railroad journals, vibrating screens, steel mill machinery and other hard-service locations.

Send for your free copy of Bulletin No. 365-6 which gives complete facts—sizes available—increased life you can expect for each size. And remember that a Sales Engineer in any SKF District Office can and will help you make the best use of it.

7465

SKF INDUSTRIES, INC., PHILADELPHIA 32, PA.
—manufacturers of **SKF** *and* HESS-BRIGHT *bearings.*

©SKF INDUSTRIES, INC., 1953

SKF®
BALL AND ROLLER BEARINGS

Industry News

(*Continued from page* 168)

American Metal, Tube Reducing Plan Merger

American Metal Products Co. of Detroit and Tube Reducing Corp., Wallington, N. J., will merge, if stockholders approve. Under the plan approved by directors of both companies, American Metal Products will be the surviving corporation.

AMP will operate both companies with separate corporate identities and with no change in present managements. Plans call for expansion at both plants if the merger is approved.

Porter Acquires Alloy Metal Firm

H. K. Porter Company, Inc., Pittsburgh, has announced acquisition of Alloy Metal Wire Company, Prospect Park, Pa.

The latter firm produces stainless and alloy steel wire, rod, and strip for use principally in the electrical, electronic, and chemical fields. Operations will continue as Alloy Metal Wire Co., Div. of H. K. Porter Co., Inc.

Armstrong Reshuffles Two, Adds One Section

The Industrial Div. of Armstrong Cork Co. has announced the formation of one new department and the consolidation of two others.

A new Friction Materials Dept. has been formed to handle the division's growing activity in the fields of power transmission and power braking. The Cork and Rubber Products and the Cork Products Depts. have been merged to form the Gasket and Packing Dept.

Stanley Aviation to Build New Plant Near Denver

Stanley Aviation Corp. has begun preparation at an industrial site near Denver for the construction of a new plant. Into it will be moved a substantial part of the company's present operations in Buffalo.

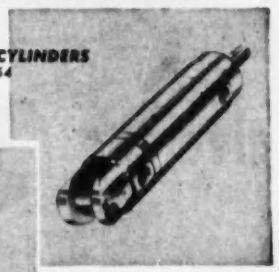
The new Denver plant is expected to be ready for operation some time next Spring. The bulk of the company's production activity eventually will be transferred to Denver but the Engineering and Research and Development Depts. will remain in Buffalo.

(*Turn to page* 175, *please*)

T-J

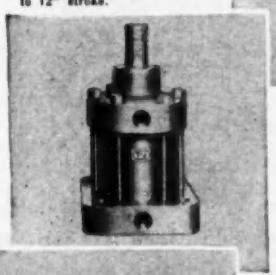
BUILT TO TAKE IT!

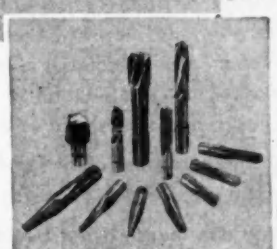
BACKED BY 38 YEARS OF KNOW-HOW!



AIR AND HYDRAULIC CYLINDERS
catalog 43 and H-47

Off shelf delivery all styles to 3" bore in increments of 1" to 12" stroke.





Let T-J performance help you *save labor* and *reduce costs* in your plant today! You'll find T-J products soundly engineered and ruggedly built for tough jobs in a wide range of applications.

For efficient power movement in pushing, pulling or lifting—up to 50,000 lb.—T-J Air and Hydraulic Cylinders with new Super Cushion and space-saving features! For high production in rivet-setting, T-J Rivitors with automatic feeding and setting . . . air or electric power. For setting clinch nuts in automotive body panels, door locks and other products . . . T-J Clinchors! For more work between grinds in tough die steel—T-J Cutters! For accurate, automatic control of presses, brakes, other machines and equipment . . . T-J Air Controls! To cut replacement costs in half . . . T-J Reamers with interchangeable heads!

Get T-J all the way for tough jobs! Send for latest catalogs. The Tomkins-Johnson Co., Jackson, Mich.

T-J TOMKINS-JOHNSON

RIVITORS AIR AND HYDRAULIC CYLINDERS CUTTERS CLINCHORS

. . . for tough jobs

give the GO-signal to DETREX

for guaranteed metal cleaning performance

When you give the go-signal to Detrex, you put into motion a skilled team of metal cleaning specialists. Their sole job—to cut your cleaning costs, to improve your cleaning quality.

Detrex, and only Detrex, manufactures both the equipment and chemicals for alkaline and emulsion washing, solvent degreasing, even cleaning by sound waves.*

As a result Detrex field engineers are familiar with all types of metal cleaning—can evaluate your cleaning operations without bias or limitation. At the same time, recommendations they make to you are carefully developed by equipment engineers and chemists working as a team. The outcome is a well-integrated process embodying the most economical combination of equipment and chemicals for the job . . . considering both initial and operating costs.

Because responsibility for the complete process is in the hands of one company, Detrex, results are fully guaranteed.

You can measure the benefits to your own metal cleaning operations without cost or obligation. All you have to do is request a free survey by our specialists. And there is no better time to do it than now!

*Detrex Sonicleen® Process

for free survey

At no obligation to you, the Detrex field man in your area will come in and survey your present or proposed operations. There is no cost for the service. The result will prove to you the money-saving advantages of Detrex service. Just fill out and mail the coupon below . . . our field man will call you for the most convenient time to come in.

DETREX CORPORATION
DEPT. 504, Box 501
DETROIT 32, MICHIGAN

Please have the Detrex man in our area make an appointment to survey our operations to point up ways of cutting cleaning costs.

NAME _____

COMPANY _____

ADDRESS _____

CITY _____ **ZONE** ____ **STATE** _____

DETREX CORPORATION

DEGREASERS • DEGREASING SOLVENTS • WASHERS
ALKALI & EMULSION CLEANERS • DRYCLEANING
EQUIPMENT • PHOSPHATE COATING PROCESSES

Industry News

(*Continued from page* 173)

Packard Executive Takes Olds Deal

Frederick J. Walters, who up until recently was part of the new Packard team as vice-president in charge of sales, has taken over an Oldsmobile dealership in Newark, N. J. He joined Packard in June of 1952 as one of the General Electric executives brought to the company by James J. Nance, who was then just taking over as president.

Morse Chain Expands Ithaca, N. Y., Plant

Morse Chain Co. has completed a $1.4 million program of modernization and expansion at its power transmission chain manufacturing plant at Ithaca, N. Y. The company also announced it is abandoning all foundry facilities there becaue of decreased demand for cast iron sprockets. Sprocket castings required by Morse now will be purchased from outside sources.

Manufacturing facilities for the chain plant have been expanded through conversion of a 75,000 sq ft former foundry area to punch press and heat-treating operations. An addition comprising 3420 sq ft also has been added to the former foundry building to provide steel storage facilities.

Curtiss-Wright Developing Markets for Civilian Goods

Curtiss-Wright Corp. is devoting considerable attention to the development of civilian markets for the products of its Metals Processing Div. in Buffalo. The company has already set up a new department charged with the development of new commercial products.

Further proof of the company's commercial intentions is found in an agreement with the Air Force which permits Curtiss to use a huge Air Force hydraulic press for civilian work when the press is not busy making aircraft propellers.

Taxis for Argentina

An order for 3000 Diesel taxicabs for service in the Argentine has been received by the Mercedes-Benz Co. They will be the 170 SD type with an enlarged rear seat, a bench-type front seat in place of individual front seats, a radio receptor, and a taximeter.

(*Turn to page* 176, *please*)

Get top drawer engineering help

when you need it where you want it

There's engineering skill on tap for you, here at Barnes & Reinecke. Our staff is ready to tackle problems at any level, in any size, and on the basis you prefer.

You can have Barnes & Reinecke specialists as advisory and consulting supervisors on projects your own staff is developing. You can turn a long range program over to one of our project teams, working in your plant or in our office. If your staff needs quick, competent help to carry a peak load, you can get the people you need from Barnes & Reinecke.

Our engineers offer specialized experience in engines, gearing, transmissions, chassis, trucks, tractors, compressors, mobile and portable equipment, servo-mechanisms, and a wide variety of machines, mechanical products and devices.

Why not let us tell you about what we've done, how we can serve you? Call or write. There's no obligation.

Barnes & Reinecke, Inc.

234 EAST OHIO ST., CHICAGO 11, ILL. • DElaware 7-6350

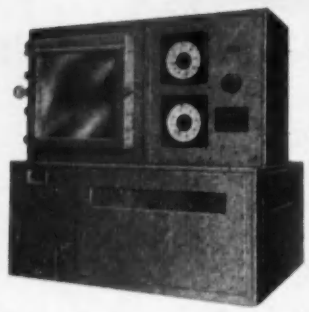
SUBSIDIARY OF JOY MANUFACTURING COMPANY

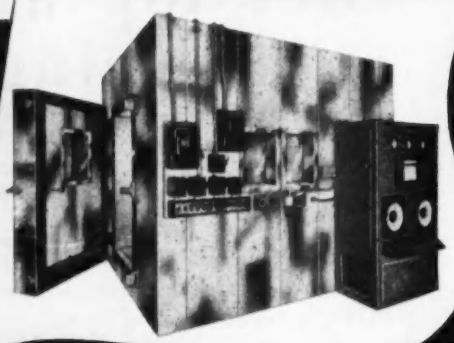
AUTOMOTIVE ENGINEERING—MECHANICAL ENGINEERING

Research • Development • Testing • Prototypes

Considering Environmental Test Equipment?

Be sure to look beyond the unit . . .





Bowser Technical Refrigeration pioneered the development and manufacture of environmental test equipment.

Bowser's complete engineering staff is available (at no obligation) to help in solving YOUR difficult test problems. Design engineers and production facilities are available to construct test equipment to meet your specialized requirements.

Typical of Bowser's standard test chambers are the Laboratory Unit and Walk-In Room shown above.

The Laboratory Unit has a temperature range from +200° F to −100° F, relative humidity range from 20% to 98%, altitude from sea level to 100,000 feet.

Standard Walk-In Rooms simultaneously produce altitude to 100,000 feet, temperature range from −100° F to +200° F, relative humidity from 20% to 98%.

Bowser also builds explosion chambers, sand and dust chambers, humidity simulation units, and environmental simulation chambers to meet any desired specifications.

Write for free descriptive bulletins or request a Bowser field engineer to consult on YOUR environmental test problem.

BTR

BOWSER TECHNICAL REFRIGERATION

DIVISION BOWSER, INC. TERRYVILLE CONNECTICUT

Industry News

(*Continued from page* 175)

IHC Plays Big Role In Mexican Industry

International Harvester of Mexico is playing a sizable role in the industrial progress of Mexico. It is producing agricultural machinery and trucks and training skilled technicians. The firm's plant in Saltillo represents an investment of $1,859,300, employs 500 persons, and has a gross annual output of approximately $6.973 million.

While the factory produces trucks and agricultural machinery, it also manufactures a wagon for hauling sugar cane that is exported throughout the world and a peanut-picking machine which is shipped to the U. S. The plant is currently developing a cheap mechanical cotton picker with the idea of producing equipment that can compete with the low-cost hand labor.

Sheaffer Pen Sets Up New Tool and Die Div.

The Sheaffer Pen Co. recently embarked on a new operation with the opening of a $1.5 million tool and die plant at Fort Madison, Iowa. It will produce tools, dies, fixtures, and special machines for other companies throughout the nation as well as for the pen company.

De Havilland Acquires Edmonton Factory

De Havilland Propellers, Ltd., has acquired a new factory in Edmonton, England. It will be used to build-up capacity for machining operations on the new type of hollow-steel blade propeller for large turbine-powered aircraft.

Alcoa Subsidiary Opens New Plant in Mexico

Alcomex, S.A. has opened its new million dollar aluminum plant in the Federal District of Mexico. The plant will produce aluminum tubing and fittings for the automotive and building industries.

At inaugural ceremonies, I. W. Wilson, president of the parent firm, Aluminum Co. of America, stated that it may only be the start of similar operations in Mexico. Alcomex is an Alcoa affiliate, formed with Mexican and U. S. capital.

(*Turn to page* 178, *please*)

you will find the modern approach to your SOLENOID VALVE problems...

SKINNER VALVES GUARANTEE

MILLIONS of CYCLES

(on most applications)

The measure of performance in an electric valve is in *cycles*—millions of them in Skinner Valves... with the kind of guaranteed performance made possible through the constant research, lab testing and design facilities, know-how of Skinner engineers and the productive capacity of an ultra-modern plant. Skinner Solenoid Valves have a record of *satisfactory* and *dependable performance* in countless installations for gaseous or liquid control. Many models are Underwriters' Approved. Let us approach your problem in the modern manner. Some of the many Skinner Valves are shown below.

IMMEDIATE DELIVERY ON STANDARD VALVES

SKINNER ELECTRIC VALVE DIV.
116 Edgewood Ave.
New Britain, Connecticut

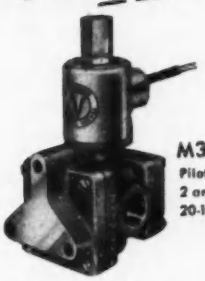
Please Help Us...

We would like complete data on the Skinner Valves checked below:

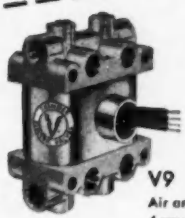
☐ V10 ☐ V61 ☐ V2 ☐ V5-2
☐ V5-3 ☐ V9 ☐ V50 ☐ M3
☐ X5 ☐ V5-3 Quick Exhaust
☐ Send full information on valves for _____

Name _____
Company _____
Street _____
City _____ State _____
☐ Have salesman call (approx.) date _____

Attach to Company Letterhead



M3
Pilot Operated
2 and 3-way
20-150 p.s.i.

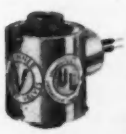


V9
Air and Hydraulic
4-way
0-150 p.s.i.

V61
Butane-Propane
2-way
0-300 p.s.i.

V5-2
All purpose
Shut-off
2-way
0-1000 p.s.i.

X5
Explosion Proof
(V5 Type)
2 and 3-way
0-300 p.s.i.



V2
Industrial
Oil Burner
(Shut-off and Time Delay)
2-way
0-200 p.s.i.

V5-3
Quick Exhaust
3-way
0-300 p.s.i.

V10
Hydraulic
3-way
0-1000 p.s.i.

V50
Aircraft
(Aluminum Body)
2-way
0-3000 p.s.i.

V5-3
Directional
3-way
0-300 p.s.i.

SKINNER ELECTRIC VALVES

SKINNER ELECTRIC VALVE DIV., The Skinner Chuck Company, 116 Edgewood Ave., New Britain, Connecticut

in air turbine grinders

YOUR BEST BUY IS BUCKEYE

here's a brand new air turbine grinder especially for carbide cutting!

FAST—
55,000 RPM
POWERFUL—
Full ¼ HP
LIGHTWEIGHT—
Just 1¾ Lbs.

More power per pound! That's the reason the NEW Buckeye Air Turbine Grinder will cut through grinding jobs faster, with less effort for the tool operator. Versatile—designed for use with tungsten carbide burrs, adaptable to use with rotary files and midget mills, may be mounted on tool post, takes mounted points up to ¼" shank.

Write NOW for complete information on this NEW addition to the Buckeye Tools line of 56 portable air-powered grinders.

bearings sealed in grease—
NEVER REQUIRE LUBRICATION
use with tool post holder—
MORE ACCURATE GRINDING
efficient turbine bucket design—ALWAYS RUNS COOL
operates without vibration—
EASY TO HANDLE
aluminum housing, steel front sleeve for longer wear—
LIGHTWEIGHT, DURABLE

Buckeye Tools
CORPORATION
DIVISION 21 • DAYTON 1, OHIO

producers of the world's first successful rotary air tools

Industry News

(*Continued from page* 176)

Republic Steel Builds New Iron Powder Plant

Republic Steel Corp. has begun construction of a $2 million iron powder plant in East Toledo, O. Expected to have a capacity of 50,000 lb a day, the facility is scheduled for completion next summer.

Monark, Red-Bar Firms Sold to Price Battery

Sale of the Monark and Red-Bar Battery firms, Dayton, O., to the Price Battery Corp., Hamburg, Pa., and plans to move the Dayton battery manufacturers to Wapakoneta, O., have been announced. Amount of the transaction was reported at around $400,000.

The Dayton firms, originally started about 35 years ago, were subsidiaries of the Monark Silver King Corp. of Chicago. That firm, which manufactures bicycles and lawnmowers, sold to Price, which has plants in Hamburg and Atlanta, Ga.

Price has purchased a plant with 50,000 sq ft of floor space at Wapakoneta and is in the process of moving equipment there from Monark and Red-Bar. The sale included equipment, inventory, raw materials and products in process.

Galion Allsteel Acquires Austin Tractor Rights

Galion Allsteel Body Co. has announced acquisition of sales and manufacturing rights to the complete line of Austin Overshot tractor loaders. The units are patented and built by John Austin Mfg. Co., Denver.

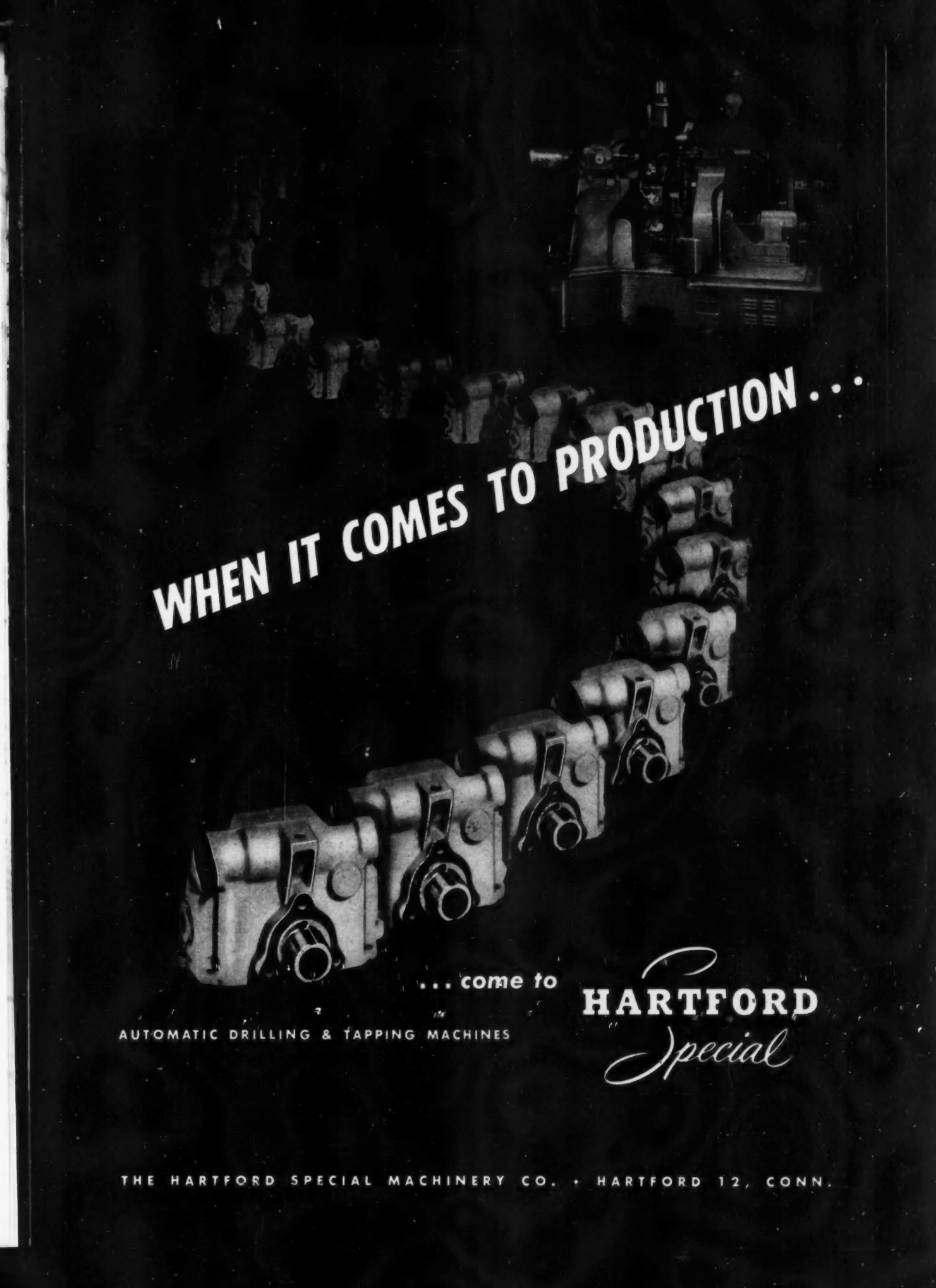
The Galion firm plans to move all Austin activities to its plants in Galion and Mansfield, O. Sales plans will be announced at a later date.

Mexican Farm Program Moves Ahead Rapidly

The further development of Mexico's agricultural program early in 1954, reportedly will include the acquisition of 30,000 heavy-duty tractors. Expenditures for them are expected to total $11,630 million.

The Ford Motors Co.'s Mexican tractor assembly plant will also start production of new equipment with Diesel engines of 45 and 60 hp. It is expected that they will stand up well to the heavy duty exacted by the rugged Mexican terrain.

(*Turn to page* 183, *please*)


WHEN IT COMES TO PRODUCTION . . .
. . . come to
HARTFORD
Special
AUTOMATIC DRILLING & TAPPING MACHINES
THE HARTFORD SPECIAL MACHINERY CO. • HARTFORD 12, CONN.

NEW CARBOLOY
CEMENTED CARBIDE

Increases production up to 30% on heavy-duty steel-cutting jobs

New Grade 370 Carboloy cemented carbide cuts more cubic inches of steel per minute – with longer tool life – than any existing carbide. The first of the new Series 300 cemented carbides, Grade 370 was specially developed for taking heavier cuts in steel at higher speeds than ever before practical.

BUILT-IN TIP RIGIDITY

Heavy-duty, high-speed machining builds up great pressures and high temperatures which cause other tools to fail because their cutting edges deform. Grade 370 is made from start to finish by a new, carefully controlled manufacturing process which gives it a built-in structural rigidity to resist this deformation – even at temperatures of around 1800° F.

PROVED PERFORMANCE

Grade 370 has already been proved, both in Carboloy laboratories, and on tough on-the-job customer applications such as rolls, gun barrels, locomotive wheels and other heavy-duty operations. It successfully withstands higher temperatures and pressures of heavy cuts at higher speeds, and lasts longer – longer than any existing carbide. *Production goes up as much as 30%.*

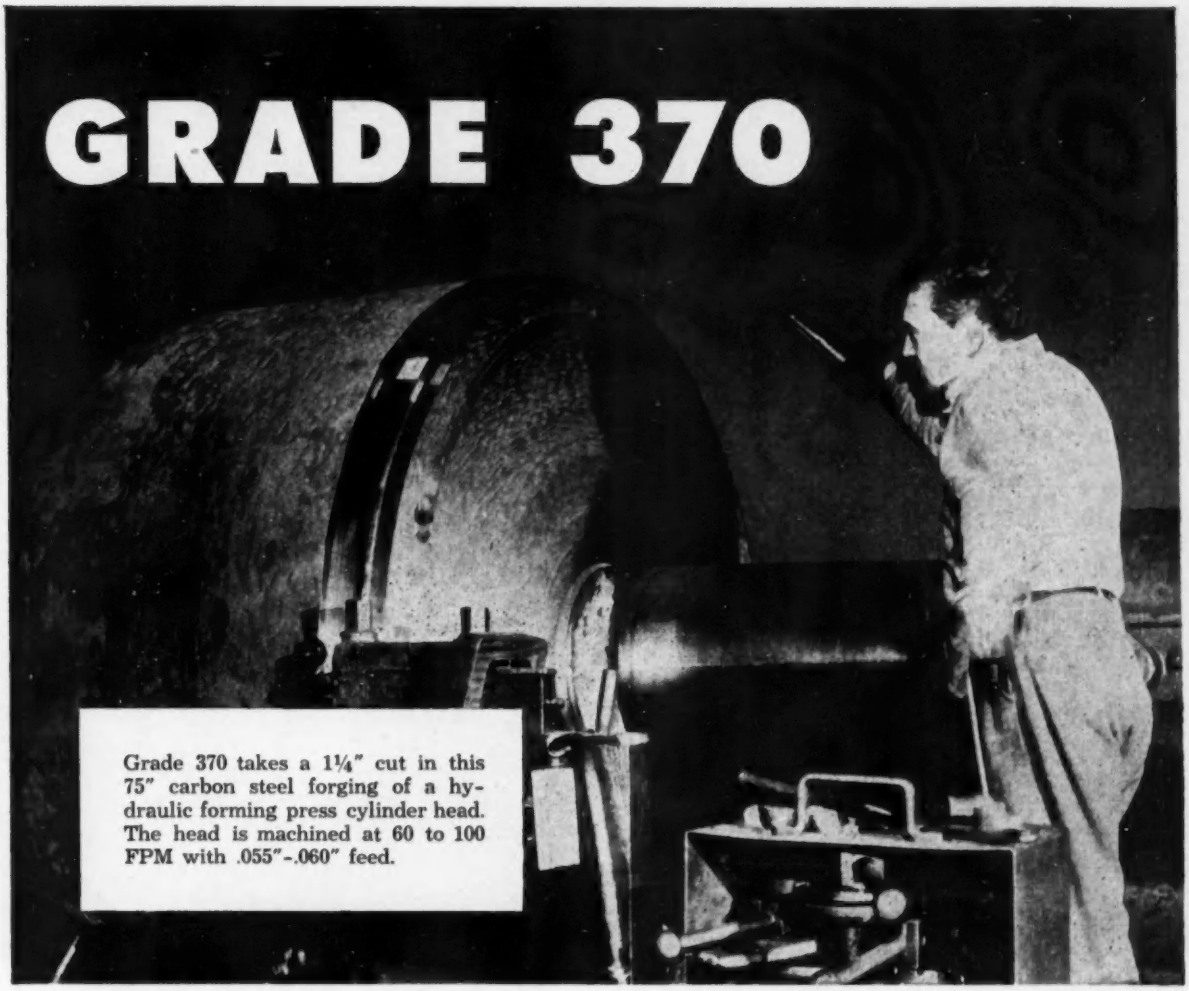
AVAILABLE NOW

Grade 370 is available immediately in a number of sizes and shapes. Send coupon today for additional information and for free technical literature. The Carboloy Engineering Appraisal Service will work with you on specific applications.

Close-up of cylinder head forging. Grade 370 cuts large chips and withstands the tremendous pressure and temperature without deforming. With Grade 370, both machine downtime and tool cost per cubic inch of steel removed were substantially reduced.

Vertical mill taking ¼" to ¾" cut in an alloy steel casting for a traction motor frame. Grade 370 machined 70 FPM with .060" feed . . . and resulted in a reduction of tool costs of approximately 10 to 1 over other carbides.

GRADE 370



Grade 370 takes a 1¼" cut in this 75" carbon steel forging of a hydraulic forming press cylinder head. The head is machined at 60 to 100 FPM with .055"-.060" feed.

CARBOLOY

DEPARTMENT OF GENERAL ELECTRIC COMPANY

"Carboloy" is the trademark for the products of the Carboloy Department of General Electric Company

CARBOLOY
Department of General Electric Company
11151 E. 8 Mile Blvd., Detroit 32, Michigan

Gentlemen: Rush me, at no cost or obligation, all facts now available on your new Grade 370 Carboloy cemented carbide.

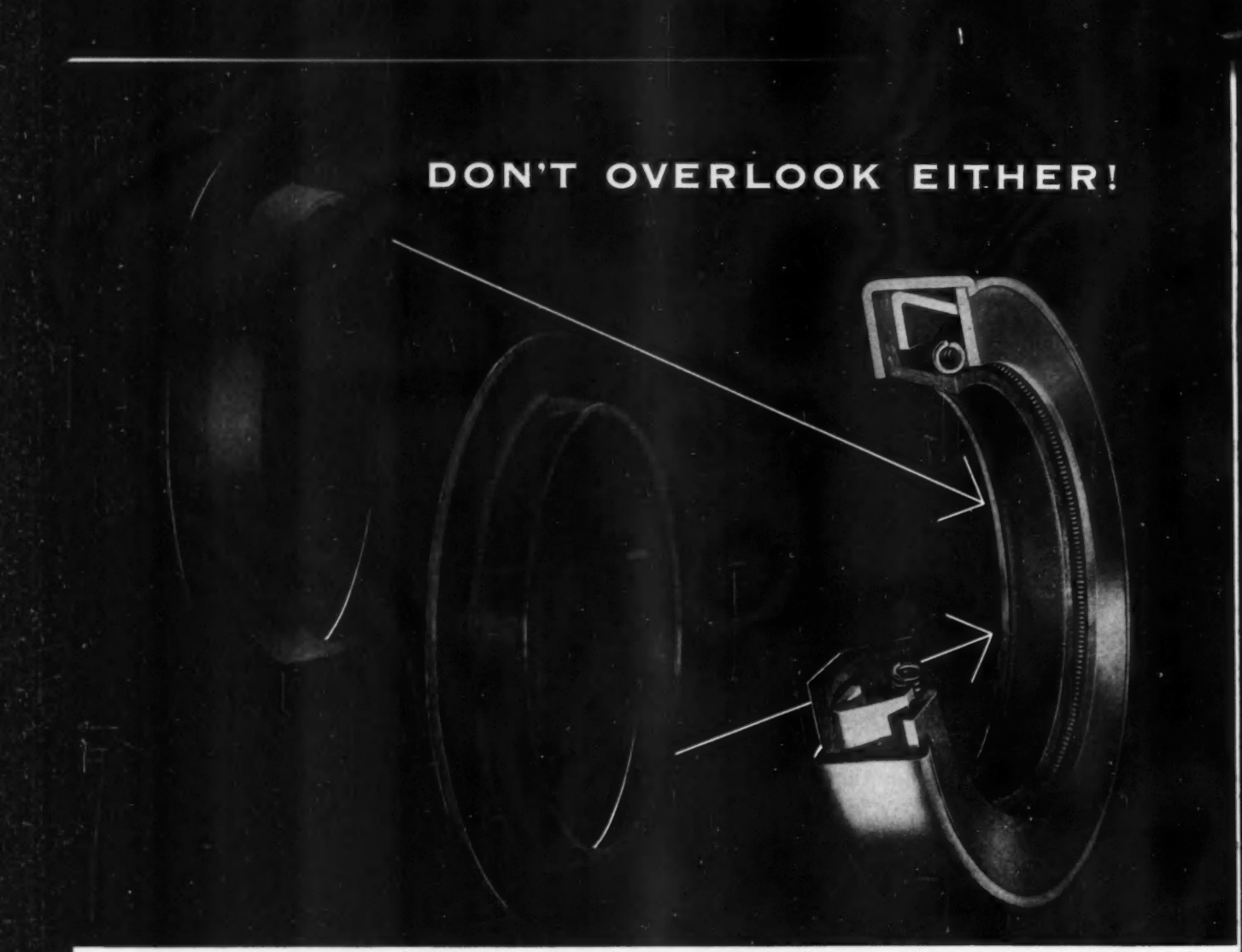
Name_____

Company_____

Position_____

Address_____

City_____ Zone_____ State_____



TWO GREAT PACKING MATERIALS . . . each with a special purpose. In thousands of unusual and critical applications custom-developed Sirvene synthetic rubber has earned unique distinction. Now comes a new C/R packing material—**Conpor**—for use where absolute control of porosity is demanded. **Conpor** is Sirvis mechanical leather impregnated with a liquid polymer under controlled conditions, to achieve the exact degree of porosity required for the lubricant problem. **Conpor** retains all the advantages of leather—flexibility, strength, stability, oil and solvent resistance. Sirvene provides a similarly wide range of advantages and is designed, compounded and molded to produce specified characteristics. May we send you "Engineering with C/R Oil Seals" and "Report on Conpor"? They'll give a good starting point for your own sealing problems.

75 C/R

PERFECT *Oil Seals*

CHICAGO RAWHIDE MANUFACTURING COMPANY

1310 Elston Avenue OIL SEAL DIVISION Chicago 22, Illinois

Representatives in these Principal Cities: Boston • New York • Syracuse • Buffalo • Philadelphia • Pittsburgh • Cincinnati • Cleveland Detroit • Peoria • Minneapolis • Wichita • Tulsa • Houston • Los Angeles • San Francisco • Seattle • Spokane • Portland

MANUFACTURED AND DISTRIBUTED IN CANADA BY SUPER OIL SEAL MFG. CO., LTD., HAMILTON, ONT.

Other **C/R** *products*

Sirvene: (Synthetic rubber) diaphragms, boots, gaskets and similar parts for critical operating conditions • Conpor: Controlled porosity mechanical leather packings and other sealing products • Sirvis: Mechanical leather boots, gaskets, packings and related products.

Industry News

(*Continued from page* 178)

Gen. Heiss Heads DOD; Deitrick Leaves OTAC

Brigadier General Gerson K. Heiss has assumed the post of commanding general of the Detroit Ordnance District, the largest in procurement within the system of 14 Army Ordnance districts. He relieves Col. Edward D. Mohlere, who held the post temporarily following the reassignment to the Pentagon of Brig. General Paul M. Sellen last August.

No successor has been named yet for Brig. Gen. Carroll H. Deitrick as commanding general of the Ordnance Tank Automotive Center. Gen. Deitrich has been named chief of Ordnance for the U. S. Army in Europe and took over his new command Jan. 15.

Hydraulic Dump Trucks to be Built in Mexico

A contract has been signed for production of the first all-Mexican hydraulic dump trucks. The terms of the contract stipulate that the Elmore Industrial Engineering Service of Mexico, S.A., is to build approximately 1500 hydraulic dump units for heavy industry trucks, as well as hydraulic tail-gate lifts for trucks.

Servomechanisms Forms Components Section

Servomechanisms, Inc., has announced the formation of a new Components Div. located at 625 Main St., Westbury, L. I., N. Y. This division will produce miniature servo and instrument motors, mechanical development apparatus, and various other products associated with the electronic and instrument industries.

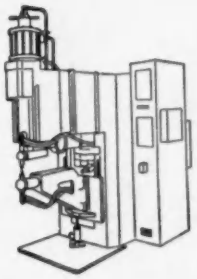
Light Plane Altitude Record Set by Cessna

A new light plane altitude record of 37,063 ft has been established by a Cessna Aircraft Corp. XL-19B. The craft, powered by a Boeing 502-8 gas turbine engine, reached the new altitude record one hr and 25 min after take-off. Previous record for this weight category was 30,203 ft, established in January, 1951.

The engine is basically a jet, but harnesses the normal exhaust thrust through a secondary turbine to drive a conventional propeller. The turbine, a Boeing 502-8, is the outgrowth of a Boeing-Navy program.

(*Turn to page* 184, *please*)

HERE'S WHAT WE MEAN BY *Engineering Assistance*



Application Engineers

T-W's Application Engineers work with you on properly applying resistance welding to your product. They give you specific answers and recommendations for your product and your production.

Design Engineers

The Design Engineers are specialists in creating welders specifically for your work. They take over when the Application Engineers have worked up the basic requirements with you.

Field Engineers

T-W has Field Engineers available in the areas near the cities listed here. They can give you on-the-spot, authentic answers to your questions. They will save you a lot of time. When you operate your welding equipment, they are on call to give you service.

Resistance Welders Since 1898

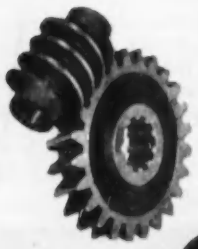
Sales and Service

CHARLOTTE · CHATTANOOGA
CHICAGO · CLEVELAND · DAYTON
DENVER · DETROIT · DALLAS
PHILADELPHIA · PORTLAND, OREGON
SEATTLE · S. PASADENA · ST. LOUIS
STAMFORD · WASHINGTON
DUNDAS, ONTARIO

TAYLOR-WINFIELD
RESISTANCE WELDERS

THE TAYLOR-WINFIELD CORPORATION • WARREN, OHIO

Here's why it PAYS to use . . .



GEARS made by FAIRFIELD

MASS PRODUCTION ECONOMY— Large or small, you get the benefits of high production rates and big volume output at FAIRFIELD—the place where fine gears are produced to meet your specifications EFFICIENTLY, ECONOMICALLY!

QUALITY PLUS—There is no finer recommendation for the quality of the product you sell than to be able to say that it is "EQUIPPED WITH FAIRFIELD GEARS!"

DEPENDABLE SOURCE OF SUPPLY— Supplier of precision-made, automotive type gears for over thirty years to leading builders of construction, agricultural, industrial, marine, and automotive equipment.

COMPLETE PRODUCTION FACILITIES—Unexcelled facilities in a new and ultramodern plant for producing Spur, Herringbone, Spiral Bevel, Straight Bevel, Hypoid, Zerol, Worms and Worm Gears, Splined Shafts, and Differentials to your specifications.

ENGINEERING SERVICE — Fairfield engineers are qualified to make expert recommendations on your gear production requirements. Take advantage of the service offered. *Your inquiry will receive prompt attention.*

FAIRFIELD MANUFACTURING CO.

2303 So. Concord Road
LAFAYETTE,
INDIANA

For FINE GEARS

Industry News

(*Continued from page* 183)

AMA Conference to Cover Problems of Marketing

Ways in which sales executives plan to meet the marketing problems of 1954 will be reported by representatives of large and small industrial and consumer companies this month at the annual marketing conference of the American Management Association. More than 1000 sales executives from all parts of the country are expected to attend the meeting, scheduled for Jan. 27-29 at the Hotel Roosevelt, New York City.

Dowty Plant Opens

Dowty Equipment of Canada recently began operations in its new plant near Toronto, Ont. The firm makes undercarriages and hydraulic equipment for the aircraft industry. It is a subsidiary of Dowty Equipment, Ltd., of England.

Houdaille-Hershey Awarded Sizeable Contract by Navy

Houdaille-Hershey Corp.'s Buffalo Div. has been awarded a new multimillion dollar contract by the Navy for top-secret ordnance equipment. Production of the equipment is expected to start this month.

The order dovetails with another large Navy order for a related component on which the plant now is working. The Navy has been placing considerable pressure on the Buffalo Div. plant to get into production on the latest secret order.

Fansteel Changes Subsidiary Name

WW Alloys, Inc., Div. of Fansteel Metallurgical Corp., is the new name of the wholly-owned subsidiary formerly known as Weiger Weed & Co. The name change was made to provide a name more descriptive of the unit's products and activities.

B. F. Goodrich Mechanizes Radiator Hose Production

Mechanized, straight-line production for the manufacture of curved radiator hose is now in operation at the new B. F. Goodrich plant in Marion, O. The capacity of the new manufacturing department is designed to take care of requirements for the foreseeable future.

(*Turn to page* 186, *please*)

Punching 7,000 holes in 90 seconds with the BLISS perforating press!

Each hole precisely located and burr-free on wrap-around stamping for Lovell dryer

TWO NEW BLISS S-2 PRESSES team up at Lovell. Each has 175 tons capacity. At left: forming a dryer inner drum head. At right: piercing a cylindrical exhaust duct.

Take a sheet of 0.037 steel, 19″ x 77″, then pierce out 67% of the area with 7,000 precise perforations. And do it continuously day in and day out at the rate of one every 90 seconds. That's how Lovell Manufacturing Co., Erie, Pa., produces its dryer wrap-around stamping with a Bliss No. 875 High Speed Perforating press. Average speed is 160 strokes per minute with a 64 punch tool.

Press accuracy and rigidity are extremely important to insure exact alignment of the comparatively fragile punches. A specially-designed Bliss feeding mechanism, built-in safety devices and accurate back gages guard against miscuts.

But dependable press performance is not unusual at Lovell. For Bliss presses have been their first choice since 1918. Today, 66% of Lovell's stamping equipment is Bliss-Built. As Tool Superintendent Raymond F. Neider points out, "Our Bliss presses have stood up well under steady operation—often through double shifts. They are rugged, yet easy to operate and maintain. But then they have to be good or we couldn't depend on them as we do."

Next time you have a pressed metal problem, ask Bliss to specify the *right* press for *your* operation. They did it for Lovell and thousands of others.

BLISS on your press is more than a name... it's a *guarantee*

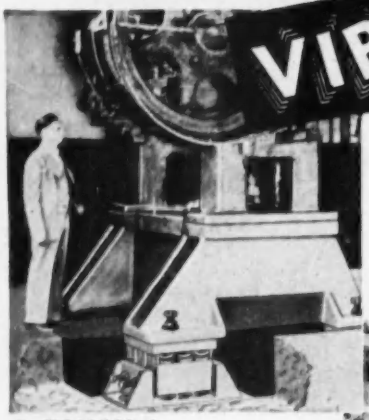
E. W. BLISS COMPANY, Canton, Ohio

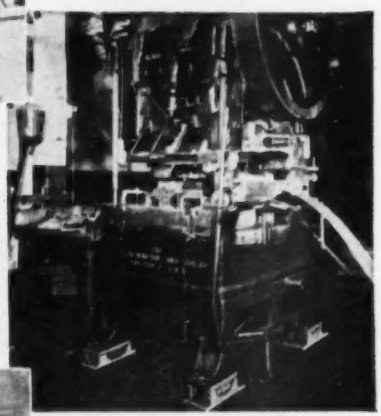
PRESSES, ROLLING MILLS, SPECIAL MACHINERY

E. W. Bliss (England) Ltd., Derby, England • E. W. Bliss Company (Paris), St. Ouen sur Seine, France

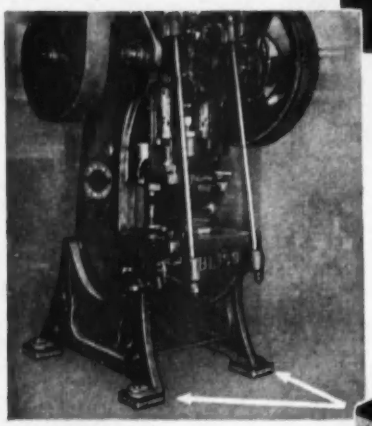
U. S. Plants in Canton, Salem and Toledo, Ohio; and Hastings, Michigan. Branch Offices in Chicago, Cleveland, Dayton, Detroit, Indianapolis, New Haven, New York, Philadelphia, Rochester, Toledo and Toronto, Canada. West Coast Representatives: Moore Machinery Co., Los Angeles and San Francisco; Star Machinery Company, Seattle. Other representatives throughout the world.

STOP VIBRATION with KORFUND VIBRATION CONTROL

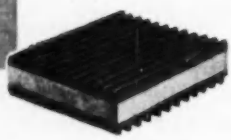




A TOUGH PROBLEM solved by specially designed Korfund Steel Spring Vibro-Isolators. Shock from this 100,000#-600 ton capacity press was cracking building walls. Four specially designed 25,000# capacity Korfund Steel Spring Vibro-Isolators, themselves weighing 600# each, were installed under the press. Building damage stopped and heavy production schedules were maintained. Yet, the price of the special Korfund Isolators was less than 3% of the press cost.



AN AVERAGE PROBLEM—typical of those solved every day by Standard Korfund Steel Spring Vibro-Isolators. Vibration and noise from this double crank press, which could be felt and heard throughout the building, were stopped by Standard Korfund Steel Spring Vibro-Isolators. More and more manufacturers are discovering how Korfund Vibro-Isolators permit press installation without reinforcement of floors, permit press installation anywhere (even near precision equipment) for better plant layout, increase press speed and production, improve quality.



A SIMPLE PROBLEM solved inexpensively and effectively by Korfund Elasto-Rib Pads. In this case, Elasto-Rib Pads installed under each of the legs of this press stopped transmission of vibration and noise. For the less critical installation, Korfund Elasto-Rib Pads provide low-cost, effective vibration and noise control, and eliminate bolting to the floor.

PUNCH PRESSES are notorious for the amount of vibration and noise they transmit—yet in the three cases illustrated, Korfund Vibration Control units successfully solved the problem. In our files are scores of case histories describing equally satisfactory installations on many other types of machinery.

A selector chart is available giving recommendations for various vibration control problems. Write for your copy of Bulletin No. 13, or see our catalog in Sweet's Files.

See us at Booth 1001 at the Plant Maintenance Show CHICAGO January 25-28

THE KORFUND CO., INC.

KORFUND VIBRATION CONTROL — SPRINGS — RUBBER — CORK

48-02A Thirty Second Place, Long Island City 1, N. Y.
In Canada: 510 Canal Bank, Ville St. Pierre, Montreal

Industry News

(*Continued from page* 184)

Andrews-Alderfer Expanding Plant

Andrews-Alderfer Co. has announced the expansion of its new plant at Akron, O., to increase and diversify production facilities for foam and fabric combination materials. As a result of this increase in facilities, the company now is capable of coating a wider variety of fabrics with thin precision gages of latex foam.

F. L. Jacobs Cuts Operating Loss

F. L. Jacobs Co. reports that its net loss for the fiscal year ended last July 31 was greatly reduced compared with the previous fiscal year. The deficit for the 1953 fiscal year was $559,703, compared with more than $2 million a year earlier.

The company reported that it had an actual operating profit of nearly $349,000 last year but that certain write-offs and special charges incurred to put the business on a sound basis reduced the operating profit to a loss. Sales during the last fiscal year rose 40 per cent to more than $28.56 million.

Bill Jack Firm Wins Computer Contract

Announcement of a $9.395 million contract from the Air Force for the construction of an undisclosed number of airborne analog computer systems has been made by the Bill Jack Scientific Instrument Co. Each system manufactured under the order consists of multiple interchangeable plug-in package components to control camera operations in high-speed, high-altitude reconnaissance aircraft.

Film on Taps Ready for Group Showings

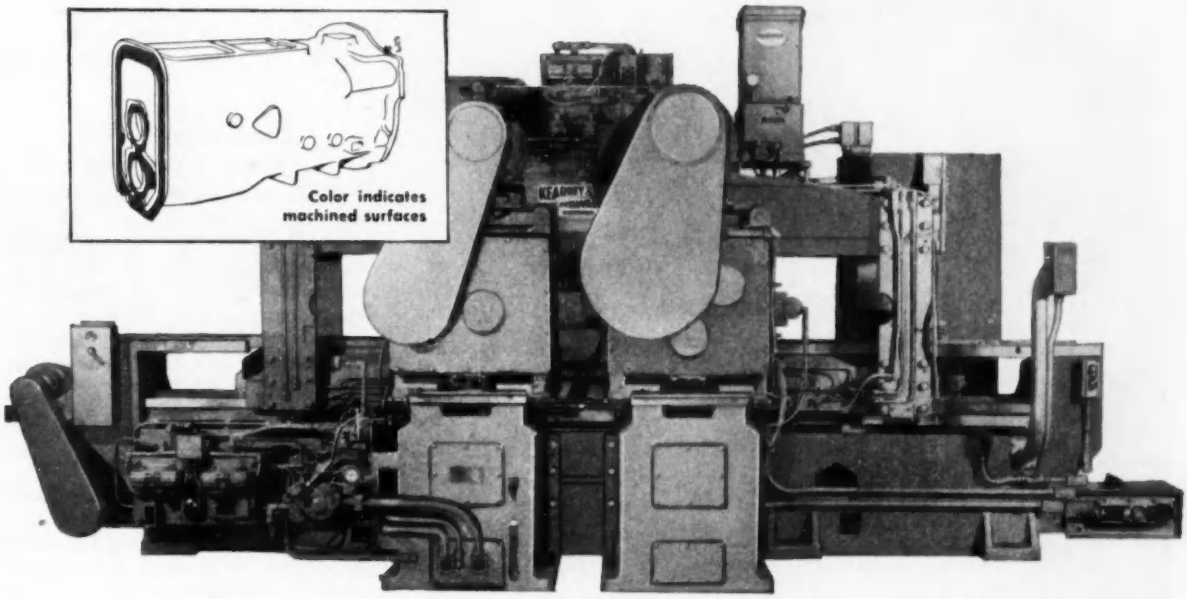
Threadwell Tap & Die Co. has produced a 15-min sound slide film entitled "Taps and Tap Terms" which is available for group showing.

The film explains in simple straightforward language the kinds of taps and the terms applied to various parts of a tap. Arrangements for showings before groups can be made by writing Threadwell Tap & Die Co., Greenfield, Mass.

(*Turn to page* 188, *please*)

What a saving...

Builders of Precision and Production Machine Tools since 1898



For the customer... it combined four milling operations in one machine!

THIS special 6-spindle transfer type milling machine was designed and built to keep a tractor manufacturer's production line rolling at high speed. The machine now mills opposing end faces of tractor transmission cases both flat and parallel . . . to close tolerances (.002) . . . in only 94 seconds.

FOUR HYDRAULICALLY RETRACTING HEADS... First two heads have two spindles each for roughing. Second two heads have one spindle each for finishing.

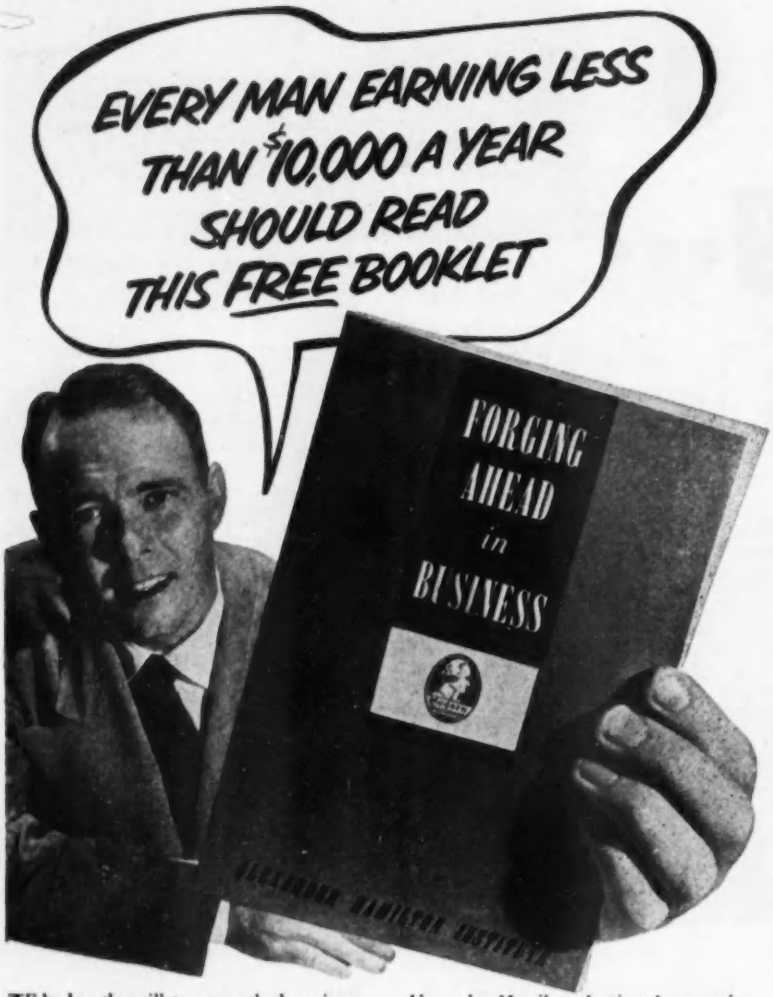
CLAMPING MECHANISM... Large hollow workpiece is secured at each machining station by a tunnel-type hydraulic equalizing clamping fixture. This eliminates the distortion usually encountered when clamping this type of workpiece.

If you have problems that require special machinery—contact your Kearney & Trecker representative.

Capacity . . . Experience . . . Performance
Upon completion of this $5,200,000 expansion of our Special Machinery Division, we offer you (1) unmatched facilities, (2) experience based upon more than 50 years in the design and production of special machinery, and (3) performance, best recommended by our outstanding record of successfully solving many hundreds of unusual machining problems.

For more details on this machine . . . ask for *Data Sheet No. 1002.* Free booklet, "Doorway to a proven method for solution of big and small metalworking problems" is also yours for the asking. *Write today to* SPECIAL MACHINERY DIVISION, KEARNEY & TRECKER CORP., 6784 West National Ave., Milwaukee 14, Wisconsin.

KEARNEY & TRECKER CORP. · *Special Machinery Division*
MILWAUKEE 14, WIS., U. S. A.



IF he has the will to succeed, there is no reason why any man of normal intelligence should suffer the smart of failure.

"Forging Ahead in Business" tells you why!

This inspiring, 48-page book explains how you can bridge the gap between your present job and the one above—how you can *prepare now* to meet the challenge of future opportunities. It examines the popular fallacies about business that have stalled the progress of so many men, and points the way to new and exciting avenues of achievement. And it outlines the Alexander Hamilton Institute's executive-training program which has sparked thousands of men to highly-paid executive positions.

There is no charge for "Forging Ahead in Business" because the *use you make of the information* it contains is the only gauge of its value. Nor is there any obligation involved other than the obligation to read it thoughtfully, and to decide for yourself whether or not you feel the Institute can help you. To obtain your copy, simply sign and return the coupon below. It will be mailed to you promptly.

ALEXANDER HAMILTON INSTITUTE
Dept. 234, 71 West 23rd Street, New York 10, N. Y.
In Canada: 54 Wellington Street, West, Toronto 1, Ont.

Modern Business

ALEXANDER HAMILTON INSTITUTE
Dept. 234, 71 West 23rd Street, New York 10, N. Y.
In Canada: 54 Wellington Street, West, Toronto 1, Ont.
Please mail me, without cost, a copy of the 48-page book—
"FORGING AHEAD IN BUSINESS"

Name.....

Firm Name.....

Business Address.....

Position.....

Home Address.....

Industry News

(*Continued from page* 186)

Lunn to Make Body Parts for Chevrolet Corvette

Lunn Laminates, Inc. has signed a prime contract with Chevrolet Div. of General Motors Corp. to make reinforced plastic body parts for Chevrolet's Corvette.

Prior to this contract, Lunn was molding Corvette bodies in its Ashtabula, O., plant on a subcontract basis.

Cambridge Plastics Name is Changed

St. Regis Paper Co. has announced that the name of the company's plastics subsidiary, Cambridge Molded Plastics Co., has been changed to Cambridge-Panelyte Molded Plastics Co. The Cambridge firm will continue to operate under the same management with the St. Regis Panelyte organization acting as exclusive sales outlet for the company's output.

Continental in France

Continental Industrial Engineers, Inc., has announced the recent consummation of an agreement with Fours and Fumisterie Industrielle, Paris, France, to negotiate contracts in France and supply construction engineering for Continental industrial furnaces, special machines, and complete automatic mass production lines.

L-M Expansion Underway at Metuchen, N. J., Plant

The recently announced expansion program at the Lincoln-Mercury assembly plant at Metuchen, N. J., is now underway. An addition to the west side of the plant and another to the north end will add a total of 120,000 more sq ft.

Paint facilities will be enlarged and rearranged, and ovens will be converted to gas. Metal finishing lines will be relocated and trim lines will be expanded.

Motor Products Gets New Aircraft Order

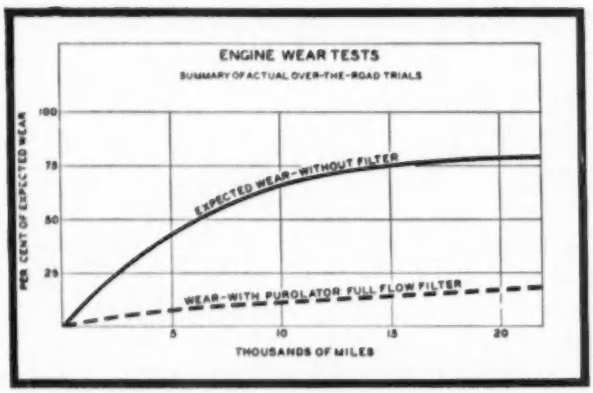
Motor Products Corp. of Detroit has received a $6.5 million subcontract from Grumman Aircraft Engineering Corp. The new order is for production of major fuselage assemblies for Navy jet fighter planes and is an extension of present subcontracts.

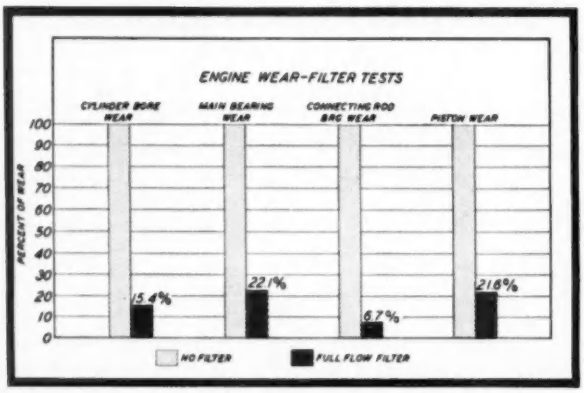
McLouth
STAINLESS
Steel

For the product you make
today and the product you
plan for tomorrow.

McLouth Steel Corporation
DETROIT, MICHIGAN
Manufacturers of Stainless and Carbon Steels

Why leading automotive manufacturers say—





It's *Purolator** for Full-Flow!

In the charts above, you see summaries of important filter research programs, conducted independently by *two* of the world's largest automobile and truck manufacturers.

These were exhaustive investigations, taking several years to complete, in which virtually every available type and make of filter were tested.

What were the results? *Purolator filters out-performed all others by a significant margin.* In severe over-the-road tests of trucks and passenger cars, Purolator Full-Flow filters held engine wear to such an amazing minimum that often it was unmeasurable . . . while control vehicles *without* filters had to have complete engine overhauls.

In many other comparative tests, *conducted by vehicle and engine manufacturers themselves,* Purolator filters have been proved best . . . in fineness of filtration (.0000039 in.), in filtering area, in dirt storage capacity and in durability.

If you want further proof of Purolator's superiority, why not make your *own* tests . . . in your own way . . . under your own conditions? Purolator's Engineering Department will gladly co-operate in helping you adapt modern, super-efficient Purolator Full-Flow filtration to your own requirements.

*Reg. U. S. Pat. Off.

PUROLATOR PRODUCTS, INC.
Rahway, New Jersey and Toronto, Ontario, Canada
Factory Branch Offices: Chicago, Detroit, Los Angeles

PUROLATOR
WORLD'S FINEST OIL FILTER

By any yardstick —

Transmission Life up 100%

Pulling away from the shovel with 50 tons on its back, this 1LLD Euclid heads for the dumping site at 25 mph. Thirty of these "Eucs," each with two TORQMATIC DRIVES, hauled more than 1,000,000 yards a month for Western Contracting Corporation on the Fort Randall Dam project.

By any yardstick—miles, hours, ton-miles—truck transmissions *last twice as long* for Western Contracting Corporation since switching from direct-drive trucks to units equipped with Allison TORQMATIC DRIVES.

And "Rip" Collins, Project Manager, gives his TORQMATIC Converter-Transmission teams a major share of the credit for his perfect safety record in 1952: *No time lost due to accidents in 740,000 man-hours worked.*

Western's fleet of 30 Model 1LLD Euclids works 20 hours a day, 6 days a week. Making 700-900 trips per shift on a 3-mile round-trip run, these "Eucs" have hauled 6½-million yards of earth in six months' time. They climb 20% grades with 50 tons on their backs.

The TORQMATIC Converter absorbs harmful shock loads, protects drive lines, transmissions, differentials and other truck components. With no clutch pedal to push and only 3 forward speeds—instead of the usual 7 or 10—drivers quick-shift at full throttle and keep their eyes on the road, not on the gearshift.

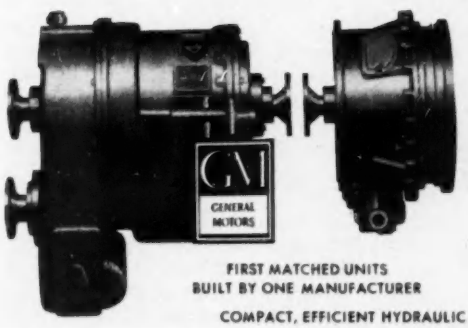
If you are in the earthmoving business, do it better and at less cost with Allison TORQMATIC DRIVES in your units. Ask your equipment dealer, manufacturer or write:

Allison Division of General Motors
Box 894A, Indianapolis 6, Indiana

ALLISON TORQMATIC DRIVES

Unbeatable Team for Maximum Operating Economy

- **Quick-Shifts** at full throttle with fingertip hydraulic control
- **Holds power to load** at all times—no clutch pedal to push—no gearshift guess
- **Reduces maintenance costs** by absorbing shock—eliminates engine lugging—prolongs equipment life
- **Only** torque converter-transmission team designed to work as a *unit* and built by one manufacturer
- **Cuts** driver training costs



FIRST MATCHED UNITS
BUILT BY ONE MANUFACTURER

Allison

TORQMATIC DRIVES

COMPACT, EFFICIENT HYDRAULIC DRIVES FOR CRANES • TRUCKS • TRACTORS • SCRAPERS • SHOVELS • DRILLING RIGS

made by
MASTER CRAFTSMEN
to insure
Matchless Performance

MASTER
SERVICE PARTS

CLUTCH RELEASE BEARINGS
Finest materials and workmanship assure less friction, longer wear.

WATER PUMPS
Lifetime-lubricated bearings. Patented long-life seals. Vacuum-tested.

TIE ROD ENDS
Four ways better! Rolled Threads, Phosphor Bronze Seat, Patented Ball Bearing Construction, Neoprene Washer and Dust Shield.

OTHER MASTER BRAND QUALITY PRODUCTS
Front End Suspension Parts • King Bolt Sets • Front Wheel Bearings
Hydraulic Brake Parts • Hydraulic Brake Hose • Stop Lite Switches
Fuel Pumps Parts and Distributors

MASTER PARTS DIVISION
AIRTEX PRODUCTS INC.
FAIRFIELD, ILLINOIS

The Nickel Industry in 1953

Demand for nickel throughout the free world in 1953 continued at a high level, with defense needs again restricting the amount of the metal available for civilian applications, Dr. John F. Thompson, chairman of the board of The International Nickel Co. of Canada, Ltd., stated in a year-end review of the nickel industry.

"It is estimated that almost half of the production of the free world during the year was allocated for its military, atomic energy and stockpile requirements," Dr. Thompson said. "Over 65 per cent of this 1953 output went to the U. S. for both defense and civilian purposes.

"Production of nickel by the free world is expected to approximate 340 million lb this year, an increase of about 20 million lb over 1952, and 50 million lb over 1951," he continued. "Canadian output, it is estimated, will reach 285 million lb in 1953, or about 85 per cent of the free world's total production.

"Governmental restrictions on the allocation and end uses of nickel in various countries, which had been in effect for several years, were substantially relaxed in 1953. The relaxation of controls occurred as a result of the progressive decrease in military demands, commencing in mid-year, and the maintenance of a constantly high level of nickel production throughout the year. The easing of military requirements allowed additional supplies of nickel to flow into the civilian economy. In August, the Manganese-Nickel-Cobalt Committee of the International Materials Conference announced it had decided not to recommend an international allocation for nickel for the fourth quarter of 1953; subsequently this Committee was dissolved. The Organization for European Economic Cooperation, in August, released member countries from a common decision to restrict the use of nickel. The United States Government, in October, revoked controls over the civilian use of nickel in that country, effective Nov. 1, after arrangements had been made which would assure that military and atomic energy requirements would be adequately met. Also in October, Canada lifted all use and purchase controls on nickel, and in the United Kingdom all similar restrictions on the metal were removed, effective Nov. 6. Other free world countries which had restrictions took similar action during the year.

"During 1953, the nickel industry has continued its extensive search for new nickel deposits. In Canada, particularly, this program has been on a scale far surpassing anything previously undertaken. The established producers of nickel have underway expansion programs which, with the output of new companies in the field, should further increase the overall supply of nickel available to the free world."

Helicopter Progress

Commenting on the helicopter in the next 50 years, Frank N. Piasecki, chairman of the Piasecki Helicopter Corp., said recently that the size and capacity of helicopters shows no inherent technical limit. Larger and larger machines, capable of lifting heavier and heavier loads, can and will be built as the basic workings of commercial economics and military planning dictate. Even today the design of helicopters over 200,000 lb in weight is foreseen.

"The most dramatic progress in the helicopter field will be increased speed of vertical-lift aircraft," he added. "This will come from two directions: helicopter designers will add speed to their machines; conversely, airplane designers will add vertical-lift capabilities to their high-speed craft. The result will be a blending of the two types of flight into machines fully capable of both helicopter flight as we know it today and high-speed flight at velocities far beyond even today's experimental supersonic speeds."

It is possible that the combination vehicle will pay penalties of weight and complexity in either the airplane or helicopter flight regimes, or in both; on the other hand, it is possible that the price of the combination will be outweighed by savings in high-speed landing devices now required and by reductions in the tremendous capital investment necessary for airports. The possibility of such machines within the next two decades is unquestionable; only their relative cost remains to be determined in the future.

One of the most challenging and promising technical avenues of helicopter advancement is development of their uses, development of techniques and equipment (both ground and helicopter-borne) to permit widest and most effective use of the unique flight characteristics of the helicopter. Automatic flight systems will permit helicopters to operate in all forms of weather, even in obstructed areas such as the hearts of cities.

it's a matter of

PRECISION!

The lift, the power, the drive . . . yes, the air-borne heart . . . of the YH-21 Piasecki "WORK-HORSE" Helicopter are delivered by the three transmissions shown here . . . the forward, mid and aft. For *this* kind of component fabrication, the best single manufacturing asset is the PRECISION for which *Steel Products* is famous!

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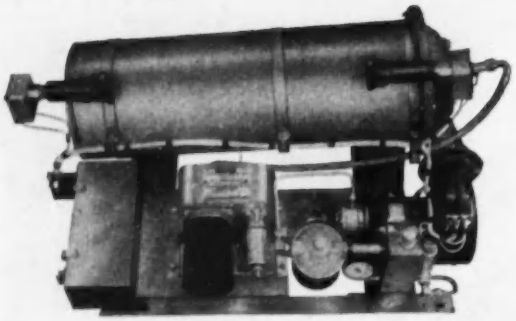

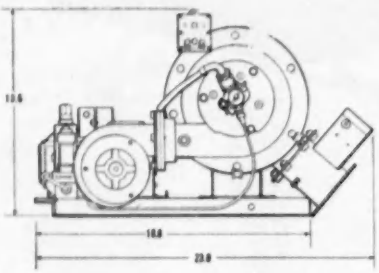

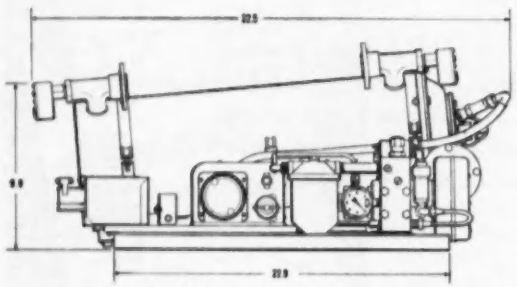

Condensed Specifications

operation	diesel oil, gasoline, or jet fuel
weight	80 lbs
output rating	90,000 Btu/hr
fuel input (continuous operation)	less than 1 gal/hr at rated output
fuel pressure	30–32 psi
power requirement	5–6½ amp at 24 volt dc
stack temperature rise	650 to 750° F
coolant circulation (calculations 30° F rise)	Water–5 gal/min Ethylene Glycol (60/40)–9.6 gal/min

dependability

Thousands of military vehicles have proved that Janitrols *do* the job. "U.R.s" are virtually non-existent—proof of field dependability. "One shot" acceptance on installation qualification tests . . . Janitrol liquid heaters passed every one the first time . . . further proof of Janitrol manufacturing dependability.

adaptability

Design for present or projected vehicles is simplified. Closed system of 1" tubing is easier to install, affords greater flexibility, saves space. Heater uses vehicle fuel—gasoline, diesel or jet fuel. Applications include fuel preheating, cab, cargo and engine pre-heating, defrosting, and maintenance of correct diesel engine operating temperature.

efficiency

Extra heat transfer area, coolant container walls exposed to radiant and convected heat. Sealed in whirling flame combustion chamber plus counter-flow coolant travel result in top heat transfer efficiency.

economy

"Demand" operation (fully automatic cycling) conserves fuel, means longer heater life. 90,000 Btu/hr output, maximum (continuous full capacity operation) fuel consumption less than one gal/hr.

maintenance ease

Interchangeable "plug-in" components speed inspection and servicing. All units, except combustion chamber, accessible for servicing without removing heater.

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"It can't be done."

You can't drill small holes and large holes at the same feed and speed."

"Well, let's see."

What do you pay off on? Feed? No! Speed? No! Production? YES!! —on your tooling cost and finished parts per hour."

DON'T YOU AGREE?

EXAMPLE (and it's extreme)

Drill stand has 30 holes 1/16" through 1/2" diameter. Completely drilled in two passes with two Zagar gearless drill heads, 16 spindles per head. All spindles run at 1200 r.p.m.

Conventional multi-speed method. So-called ideal speeds would be not less than three times as fast for the 1/16" drill as for the 1/2" drill. Ideal drill feed would be three times as heavy for the 1/2" as for the 1/16". Moreover, six passes would be necessary.

Zagar single-speed method. Only two passes. Feed is held down by strength of 1/16" drill, and speed is held down by 1/2" drill. Simplified operation; fewer indexes; far less handling. Production is at least tripled. Tooling costs drop enormously.

If you don't agree, what's your version?

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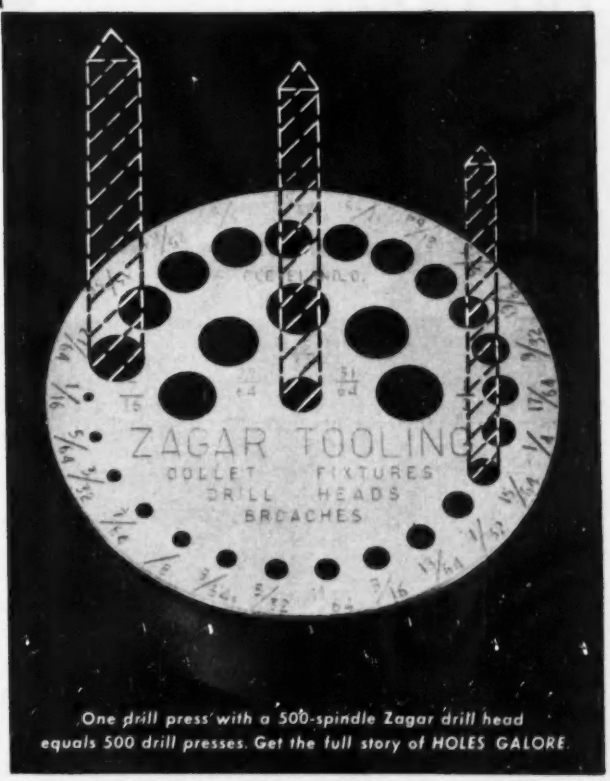

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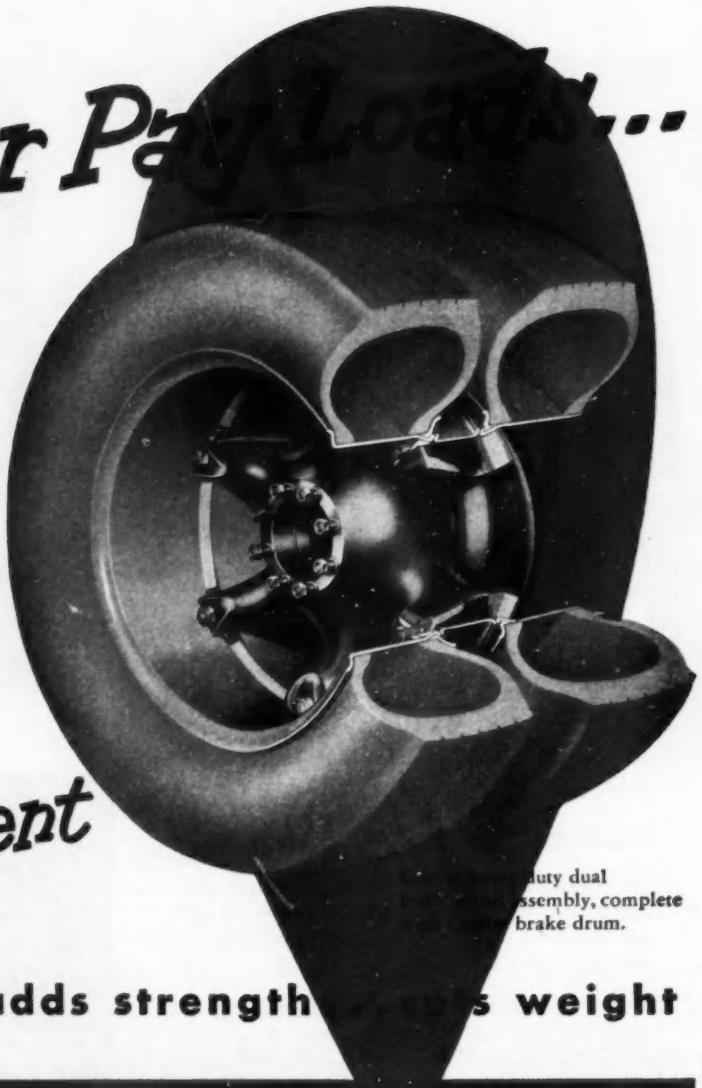

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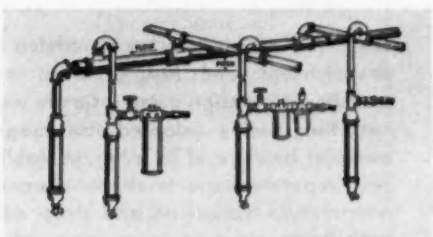

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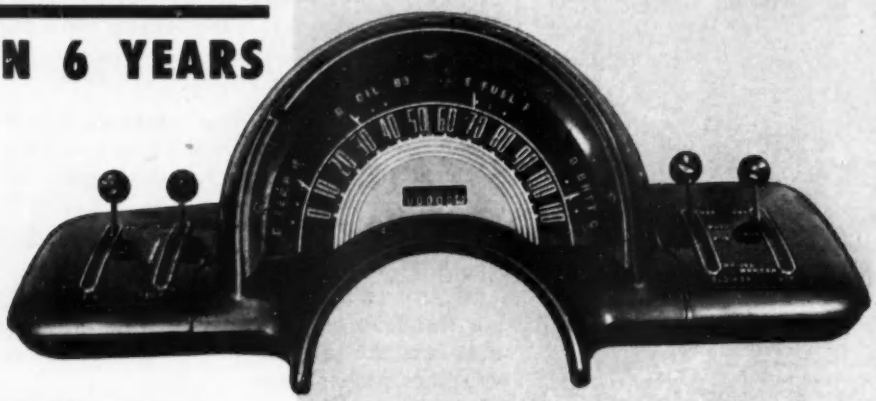

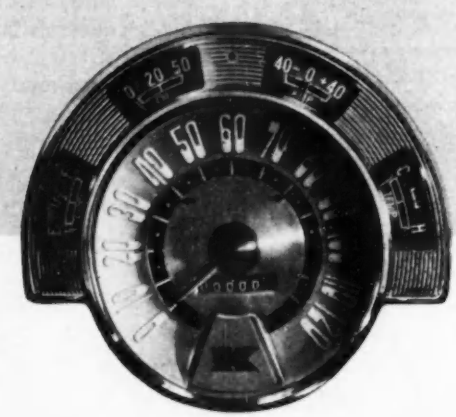

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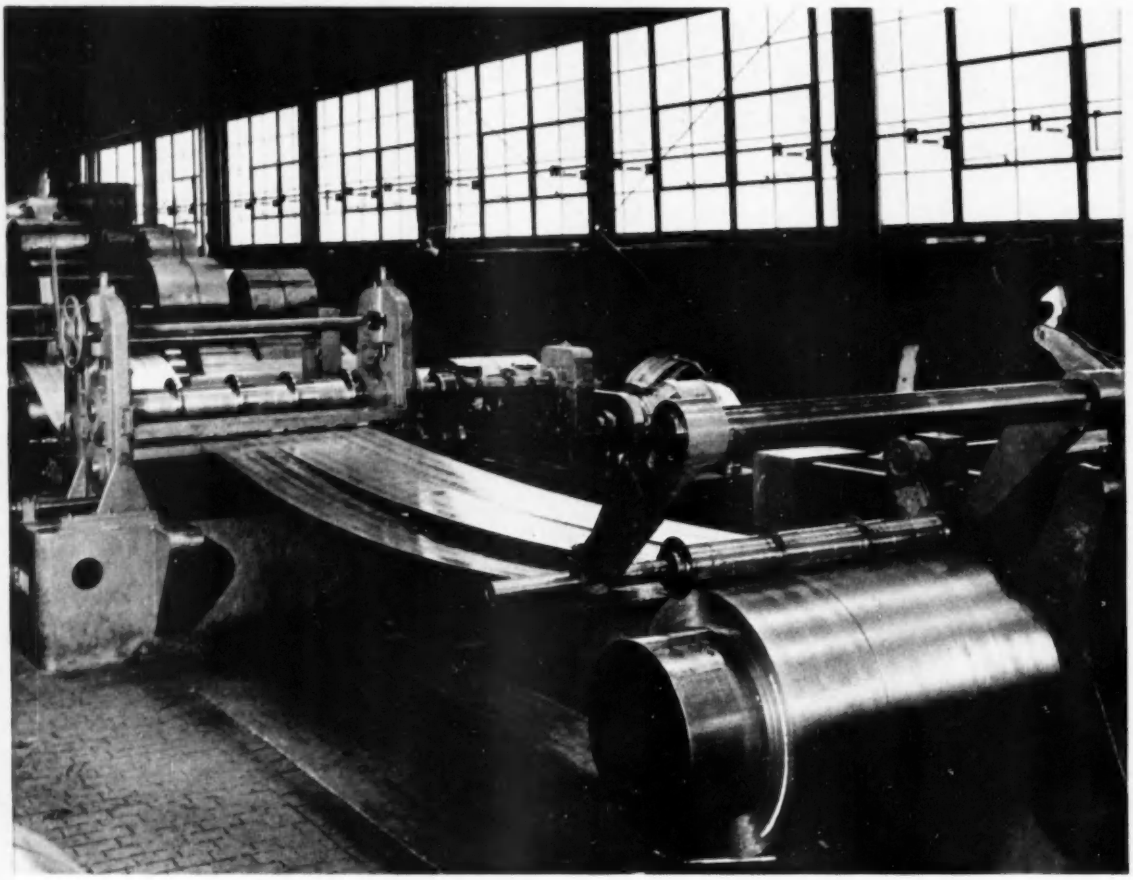

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Want to save 20 percent on your steel costs? If you are using sheet steel in any great amounts a Wean Equipment engineer can quickly show you how the amazing new Wean Slitting and Flying Shear Line can effect this savings in your plant. Using your actual figures, Wean can, by a simple comparison method, quickly prove to you that these savings are possible. Why continue operating at high costs when this improved method could be saving you as much as $20 a ton on your steel?

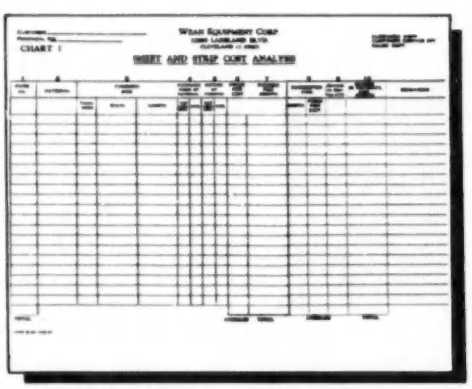
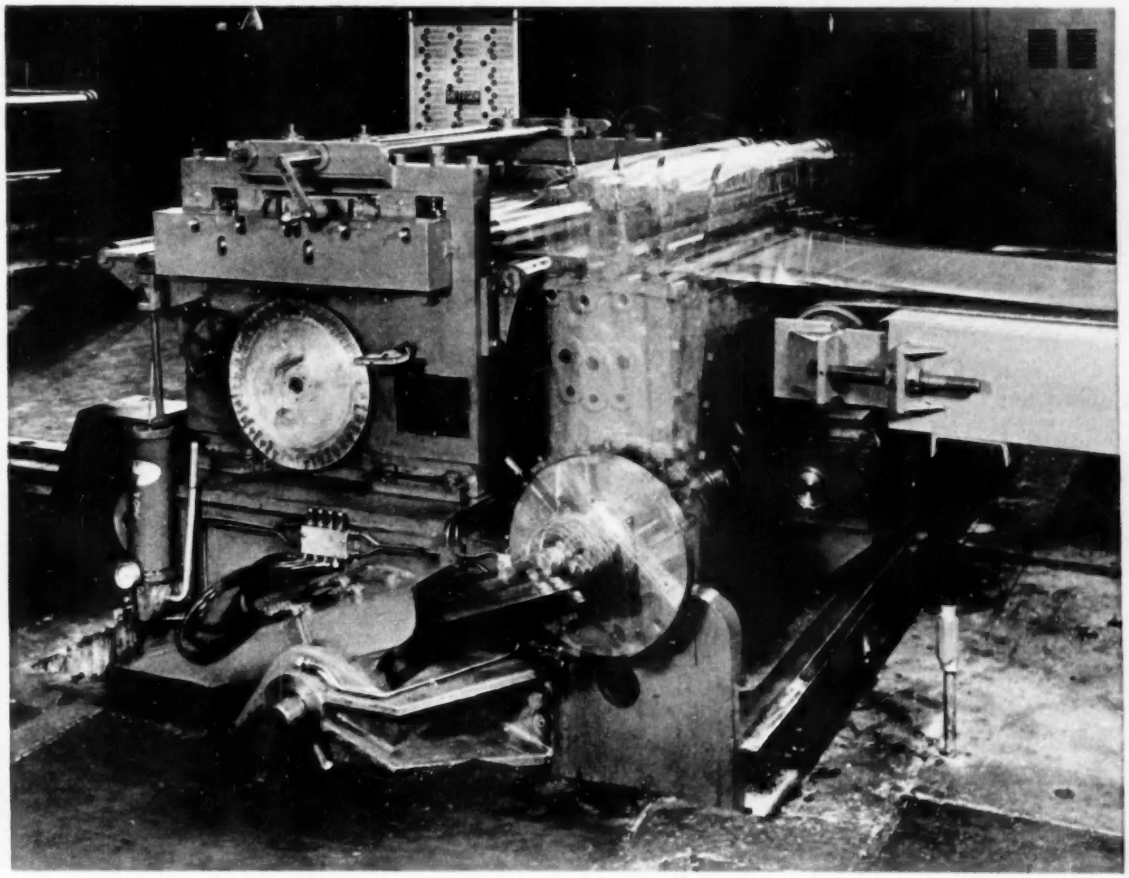


CHART 1

SHEET AND STRIP COST ANALYSIS



Slitting and Flying Shear Line On Your Steel Costs

The secret of these tremendous savings is a short cut in getting steel from coil form to fabrication. If you are not one of those already using the Wean Slitting and Flying Shear Line you are either paying high mill extras for shearing to tolerance and size or are forced to do this operation expensively and slowly in your own plant or a costly combination of both.

The Wean Slitting and Flying Shear System eliminates this entire processing function by converting steel from coil to production size, at resquared tolerances, at a rate of 100 cuts per minute.

Just figure it out for yourself. Apply these figures to your own operation. Total up the extras you are now paying for steel preparation and you'll see why it will pay you to talk with Wean.

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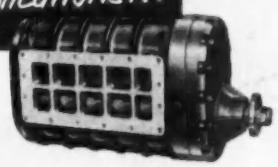
MIEHLE-DEXTER *boosts horsepower up to 50% or more in engines used on all these applications...*



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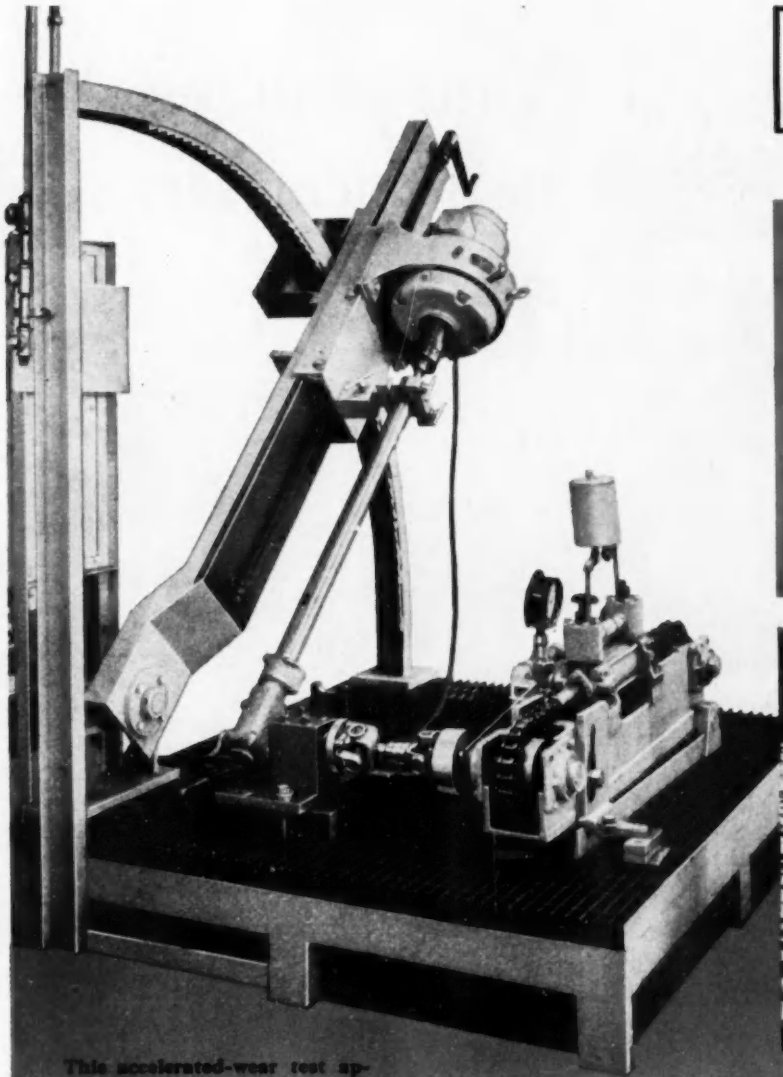
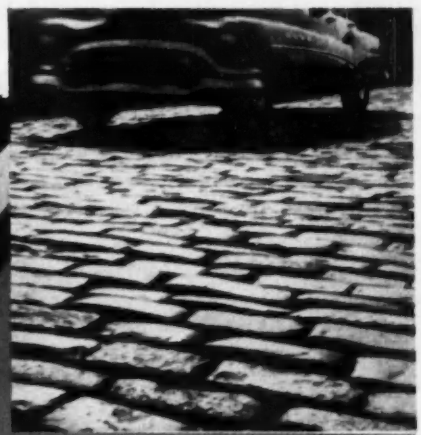


This accelerated-wear test apparatus automatically "steers" *Safety* Power Steering Gears from full left to full right many thousands of times—with a punishing load of 4500 inch-pounds constantly being applied on the pitman arm.



Safety Power Steering is also subjected to extremely tough test runs at the General Motors Proving Ground.

LEFT TURN

RIGHT TURN

Gruelling Tests Prove Stamina of Saginaw *Safety* Power Steering Gears Under Continuous 4500-Inch-Pound Load!

To make sure that the gear components of *Safety* Power Steering will stand up under far greater punishment than they will ever endure in actual service, Saginaw engineers developed this ingenious accelerated-wear test apparatus shown above.

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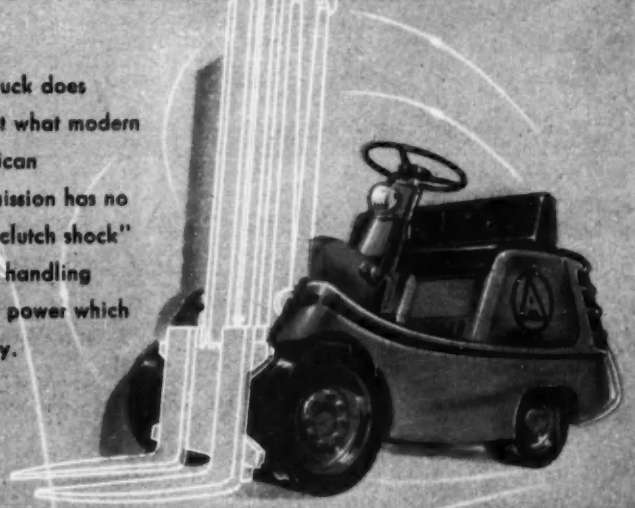

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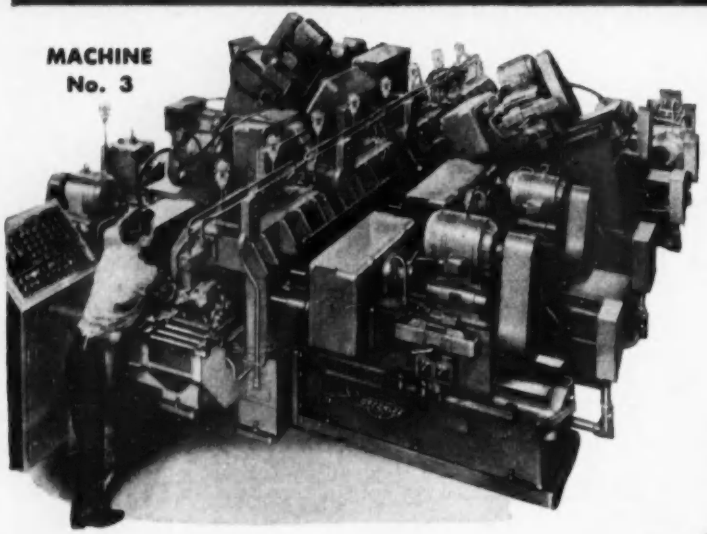

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PROCESS
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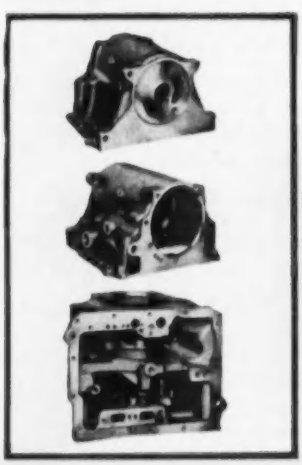

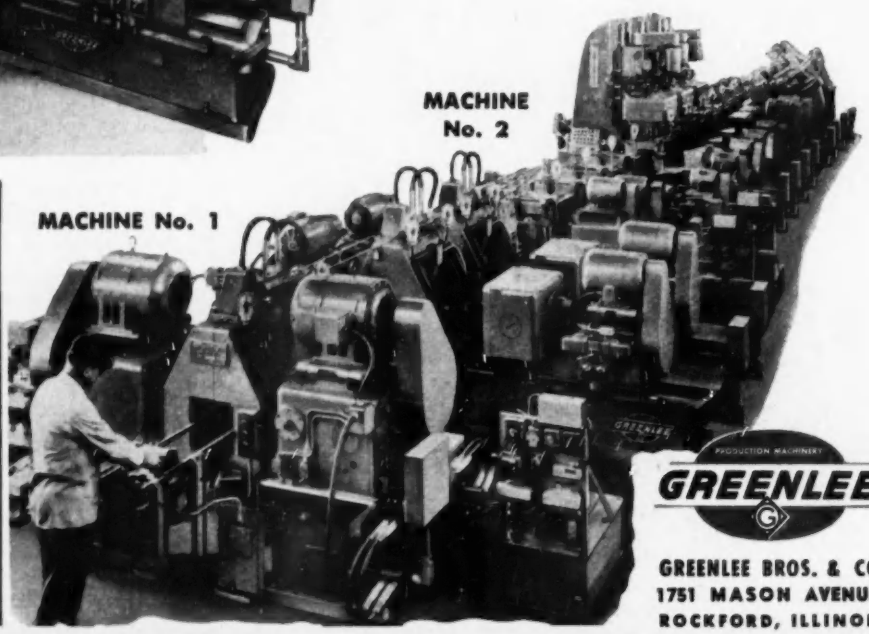

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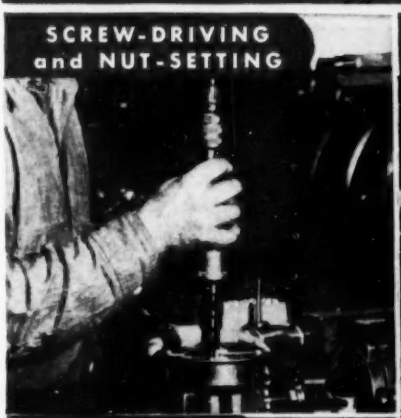

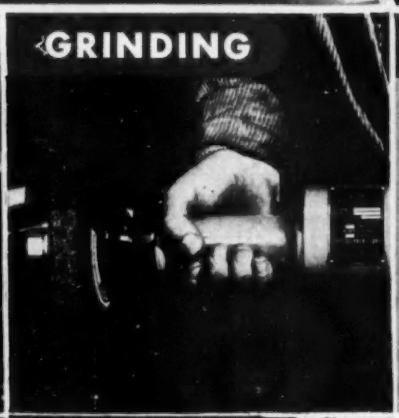

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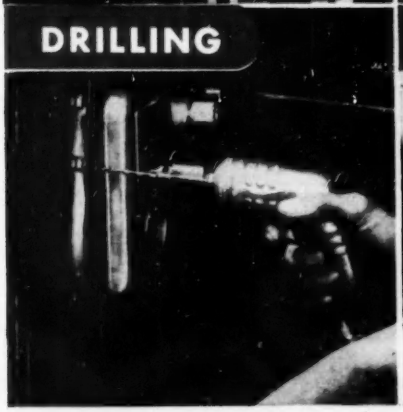

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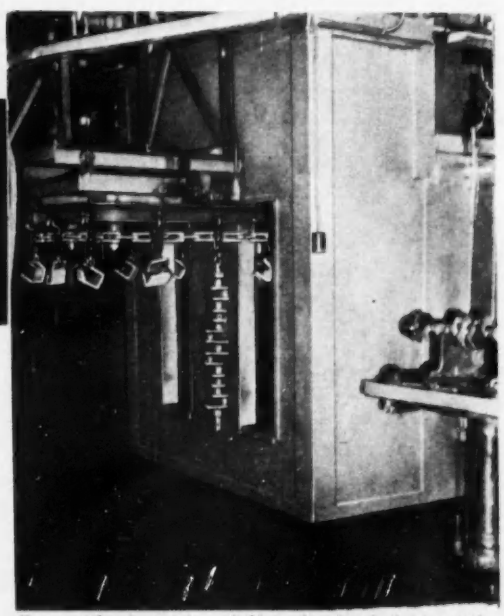
"We at Reo Motors are particularly pleased with the Burdett Crankshaft Normalizing Oven" . . .
states Ralph Griese, Plant Engineer



The operating temperature of this modern installation is 450°F., with a normalizing cycle of 1 hour 50 minutes to 2 hours.

Because

- No temperature variations on the line
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- Very little production floor space is required by the Burdett Oven.

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DOW CORNING

Silicone News

No. 4 of a Series • PUBLISHED BY DOW CORNING CORPORATION, MIDLAND, MICHIGAN

Typical Damping Applications For Silicone Fluid Simplify Design, Improve Performance

In designing the new Time-Master dictating machine, engineers at Dictaphone Corporation developed an ingenious device for damping the drop of the recording head onto the plastic Dictabelt recording medium. This device protects the diamond point on the recording stylus; prevents sharp indentation of the belt at the point of first contact; helps the recording head to ride smoothly over a slightly creased or damaged belt.

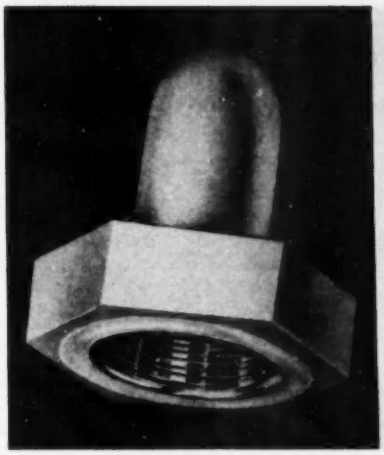
Dow Corning 200 Fluid was selected as the damping medium because its remarkably flat viscosity-temperature slope assures a constant damping force over the entire range of climatic temperatures. High resistance to oxidation and gumming assures long, trouble-free service.

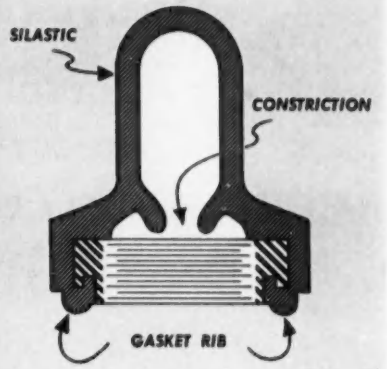
And availability in a wide range of carefully controlled viscosities reduces manufacturing costs. Liberal tolerances on the mating cylinders are compensated for by the simple selection of the fluid viscosity required to maintain an optimum damping force.

Furthermore, cost of the silicone fluid is almost negligible because the stability of Dow Corning 200 Fluid is so great that Dictaphone's engineers were able to design an effective damping device so small that the fluid is injected with a hypodermic needle.

Another recent application for Dow Corning 200 Fluid as a damping medium is in an automatic, electronic check-weight scale. Designed to weigh up to 120 packages a minute, the speed and accuracy of the scale is maintained by using a silicone fluid in the dashpot.

Organic fluids originally used as damping media thickened on cold mornings and reduced weighing speed. They thinned out in hot weather or after operating in the heat generated by the electronic components, and reduced the accuracy of the scale. These problems inherent in any fluid damping device where consistent performance is important were eliminated by using Dow Corning 200 Fluid. *No. 32*





Silastic* Boots Seal Toggle Switches at −80 to 500 F; Have 50 Times MIL Specification Flex Life at −67 F

You can seal a low temperature toggle switch by clamping a small Silastic O-ring between the metal parts. But that involves a multiple part assembly and does not provide insulation in case of short circuits.

That's why there has been so much interest in the Hexseal No. 1030, a new design developed by the Automatic & Precision Manufacturing Company of Yonkers, New York. In this unit the entire toggle is enclosed in a Silastic boot that is molded to the fastening nut.

Chemically bonded to a nickel-plated brass nut and serving both as a seal and locknut, the one-piece Hexseal can be easily and rapidly fastened down by hand. An integral rib at the base acts as a gasket when the Hexseal is secured, seating firmly against any panel surface, regardless of finish.

To determine flex resistance, the boot was subjected to 50,000 cycles at −67 F, or over 50 times the Military Specification (MIL-B-5423), without failing. It also withstood 100,000 cycles at room temperature; or 10 times the specification for the switch itself.

To make a good product even better, an inner constriction is molded in the throat of the boot. Should the tip become damaged, dirt and moisture are still excluded and pressure is still maintained. One potential user tested this feature by cutting off the tips. After thorough testing, they awarded contractual approval of the boots.

These Silastic toggle switch boots are already spreading from military to industrial applications. Originally specified for walkie-talkies, reflector buoys and bomb sights, they are now being used on industrial autoclaves and domestic butter churns.

In addition to the excellent low temperature flexibility demonstrated in the Hexseal application, Silastic 50 also gives excellent service in high temperature applications. Its dielectric properties make it a practical wire covering and cable coating for many electrical applications. With the exception of compression set, Silastic 50 meets all the requirements of SAE-ASTM Specification TA 505. It is a good, all purpose stock for making molded parts, tubing, gaskets, seals and belts that must remain serviceable over a wide range of temperatures.

Flex life of Silastic 50 at high temperatures is indicated in Table I. Failure to take a 180° bend over a ⅜ inch mandrel without breaking was taken as the end point in these flex life tests. At temperatures which caused organic rubber to fail in 8 to 96 hours, Silastic withstood 1344 to 6384 hours of exposure without failing the flex tests.

Using hardness as another measure of flexibility, samples of Silastic 50 kept

* T. M. REG. U. S. PAT. OFF.

(continued pg. 2)

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MORE

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DOW CORNING Silicone News

NEW DEVELOPMENT AND TECHNICAL DATA

For copies of any of the publications reviewed in this column or for data relating to any of the articles printed in this issue of the Dow Corning Silicone News, simply circle the corresponding reference number on the coupon below.

"Silicone Release Agents for the Plastics Industry" describes various silicone mold lubricants, methods of application and concentrations used in compression, transfer or injection molding and in extruding, sheeting, rolling or forming of plastic parts. *No. 33*

•

The "Properties of Dow Corning Electrical Insulating Varnishes and Resins" are now compiled in a handy reference sheet. Typical applications and data on dielectric properties, viscosities, thinners and drying times simplify the preliminary selection of resins and varnishes for specific applications in the electrical industry. *No. 34*

•

"Silicone Finishes for High Temperature Applications". This reprint of an article that appeared in FINISH magazine describes the properties and applications of various types of silicone resins used in formulating heat resistant paints with 10 to 50 times the life of the best organic finishes. *No. 35*

•

Silicone-based water repellent finishes for above grade masonry walls repel water and water borne stains; virtually eliminate efflorescence and spalling without plugging the pores or changing the color or texture of masonry surfaces. Easy and inexpensive to apply, such silicone treatments remain effective for many years. Over 60 formulators of masonry water repellents made with Dow Corning silicones, are listed in our current "Sources of Supply". *No. 36*

•

"Silicones in Plant Auxiliaries" is the title of a significant article that appeared in the November 15th issue of ELECTRICAL WORLD. It tells how Consolidated Edison is using silicone (Class H) insulation to increase the life and reliability of motors and transformers. Solid proof of the performance of silicone insulation are orders placed since 1945 for over 106,000 hp in Class H motors rated from 200 to 2500 hp for station auxiliary power drives. *No. 37*

•

"Shoe Saver" is a new Dow Corning silicone product recently introduced for industrial use through Safety Supply Houses. Easy to apply and economical to use, it keeps leather shoes, gloves and oil guards soft and flexible, preserves stitching, increases resistance to abrasion and heat. "Shoe Saver" lets air in; keeps water, oil and various chemicals from penetrating the leather. AVAILABLE TO INDUSTRY THROUGH SAFETY SUPPLY HOUSES. *No. 38*

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New Silicone Resin Speeds Production of Laminates with 20,000 psi Flex Strength after 200 Hours at 500 F

Silicone-glass panel boards, tubes and structural parts with flexural strengths in the range of 50,000 psi at room temperature, and 12,000 to 20,000 psi at 500 F can now be laminated at low pressures and cured in a relatively short time at 480 F or cured in service.

Such laminates made with Dow Corning 2106 retain high physical strength even after aging at high temperatures. They are also water repellent, resistant to oxidation and to attack by many inorganic reagents. Inorganic laminates bonded with Dow Corning 2106 meet the requirements of Class H insulation.

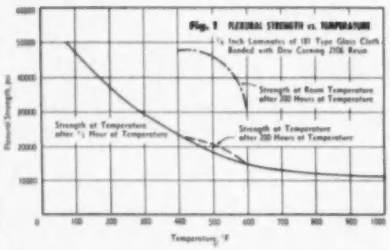
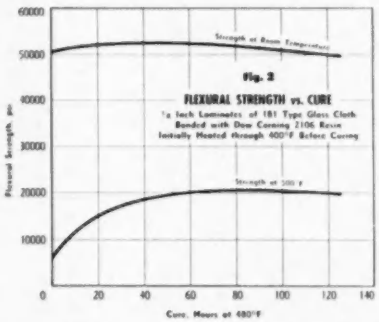


Fig. 1 FLEXURAL STRENGTH vs. TEMPERATURE
⅛ Inch Laminates of 181 Type Glass Cloth Bonded with Dow Corning 2106 Resin
Strength at Room Temperature after 200 Hours at Temperature
Strength at Temperature after ½ Hour at Temperature
Strength at Temperature after 200 Hours at Temperature
Flexural Strength, psi
Temperature, °F

Typical ⅛ inch laminates of 181 type glass cloth bonded with 2106 and cured for 48 hours at 500 F, have an initial flexural strength of 50,000 psi. As shown in Figure 1, flexural strength measured at room temperature is in the range of 40,000 to 50,000 psi after 200 hours of aging at temperatures up to 500 F. Flexural strengths measured at 100 to 1000 F after conditioning for ½ hour at the test temperature gradually decrease from 50,000 to 11,000 psi with increasing temperature. At temperatures from 100 to 500 F and after aging for 200 hours at test temperature, flexural strength is more than 20,000 psi.


Strength at Room Temperature
Fig. 2
FLEXURAL STRENGTH vs. CURE
⅛ Inch Laminates of 181 Type Glass Cloth Bonded with Dow Corning 2106 Resin Initially Heated through 400°F Before Curing
Strength at 500 F
Flexural Strength, psi
Cure, Hours at 480°F

Even before curing, such laminates have a flexural strength of 50,000 psi at room temperature, as shown in Figure 2. Flexural strengths at 500 F are: 12,000 to 15,000 psi after curing 6-12 hours at 480 F; 14,000 to 18,000 psi after curing 24 hours; 18,000 to 20,000 psi after 48 hours at 480 F. These data indicate that laminates made with Dow Corning 2106 may be cured in service. *No. 39*

SILASTIC *continued*

TABLE I RESISTANCE TO HEAT AGING

Temp	Hours	Flex Life		Durometer, Shore A	
		Silastic	Organic	Silastic	Organic
300 F	0	OK	OK	54	61
	96	OK	Failed	57	
	168	OK		59	
	1344	OK		64	
	6384	OK		65	
392 F	0	OK	OK	54	61
	19	OK	Failed	54	
	168	OK		55	
	1344	OK		62	
	6384	OK		68	
480 F	0	OK	OK	54	61
	8	OK	Failed	54	
	168	OK		60	
	1344	OK		70	

their initial room temperature hardness of 56 at temperatures up to 480 F; increased to 60 at −67 F for a total change of only 4 points over a span of 547 Fahrenheit degrees.

After 70 hours immersion in water at 212 F, Silastic 50 showed only 4% increase in volume, 4 points decrease in hardness, no change in elongation, and 11% loss in tensile strength.

Silastic 50 can be blended with Silastic 80 to make parts with any hardness between 50 and 80. It can be given almost any color by adding heat-stable pigments. *No. 40*

First in Silicones

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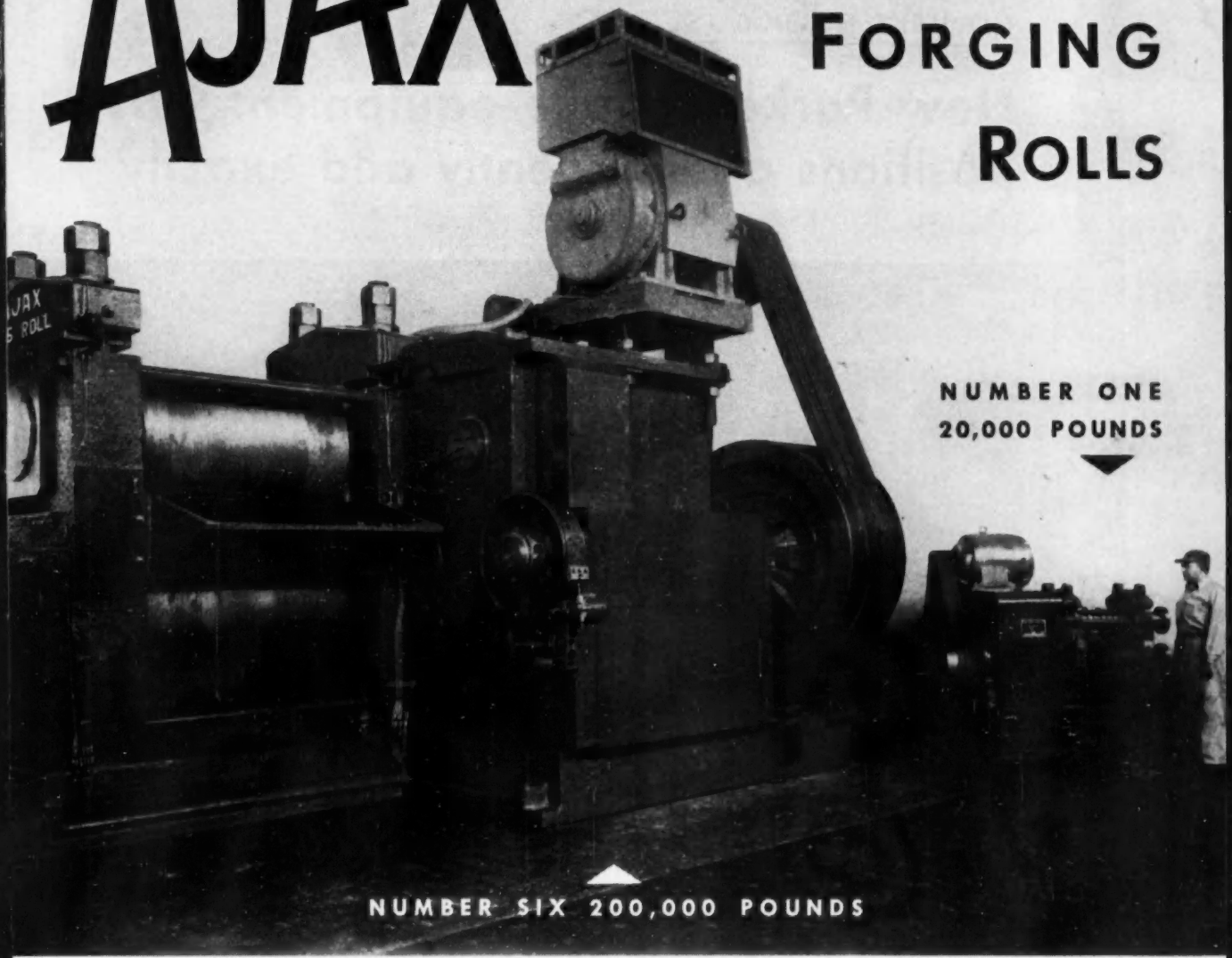
Silastic

AJAX COMBINATION DIE FORGING ROLLS



NUMBER SIX specifically used for forging aircraft components. 200,000 pound AJAX FORGING ROLL shown at the left and foreground above is designed for pre-rolling blanks for subsequent DROP forgings.

NUMBER ONE universally used in aircraft, automotive, agricultural industries. 20,000 pound AJAX FORGING ROLL shown at the right above is designed for rolling reduced tapered and straight forgings and pre-rolling blanks for subsequent PRESS forgings.

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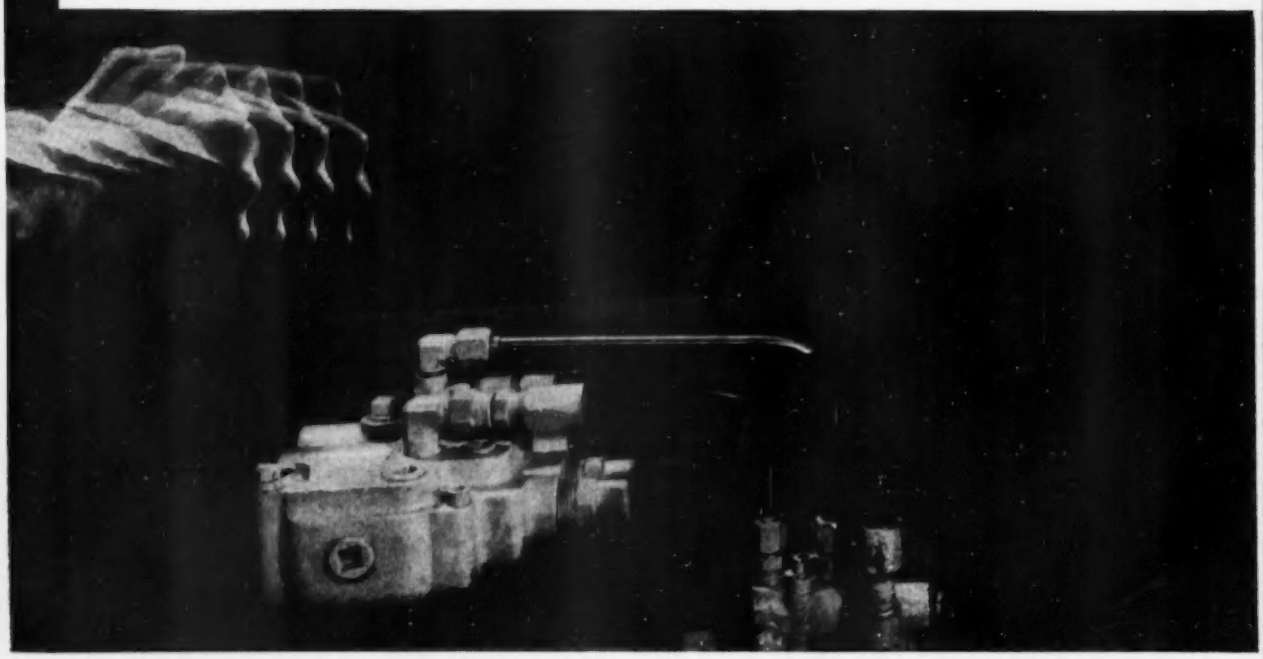
New Parker mobile-equipment valve positions a load gently and exactly



Special lift truck demonstrates gentle, exact control of new valve. Stop-action photo

Parker announces a new line of directional-control valves for mobile-equipment applications ... lift trucks, agricultural machinery, and earth-moving equipment. These valves provide gentler and more exact positioning control than any other. Here's how:

The new valve has full feathering on both open-center and cylinder ports. This feathering is especially good for two reasons. First, a load check eliminates dead spots and back flow to the pump. Second, unique spool notches provide sensitive rate-of-flow control during crossover. A full parallel circuit enables you to do several operations at once.

These new Parker valves are offered in 1, 2, 3, or 4-spool designs, with capacities up to 35 gpm. Flow characteristics can be tailored to your specific applications. For instance, the valve has a built-in carry-over for piping from one valve to another without pressurizing seals. You can add additional functions in this way.

Both designers and salesmen will be enthusiastic about the many other features and benefits. Why not call in Parker today? We would like to discuss these valves in detail ... and work with you in developing their proper application on your equipment.

INDUSTRIAL HYDRAULICS DIVISION
The Parker Appliance Company
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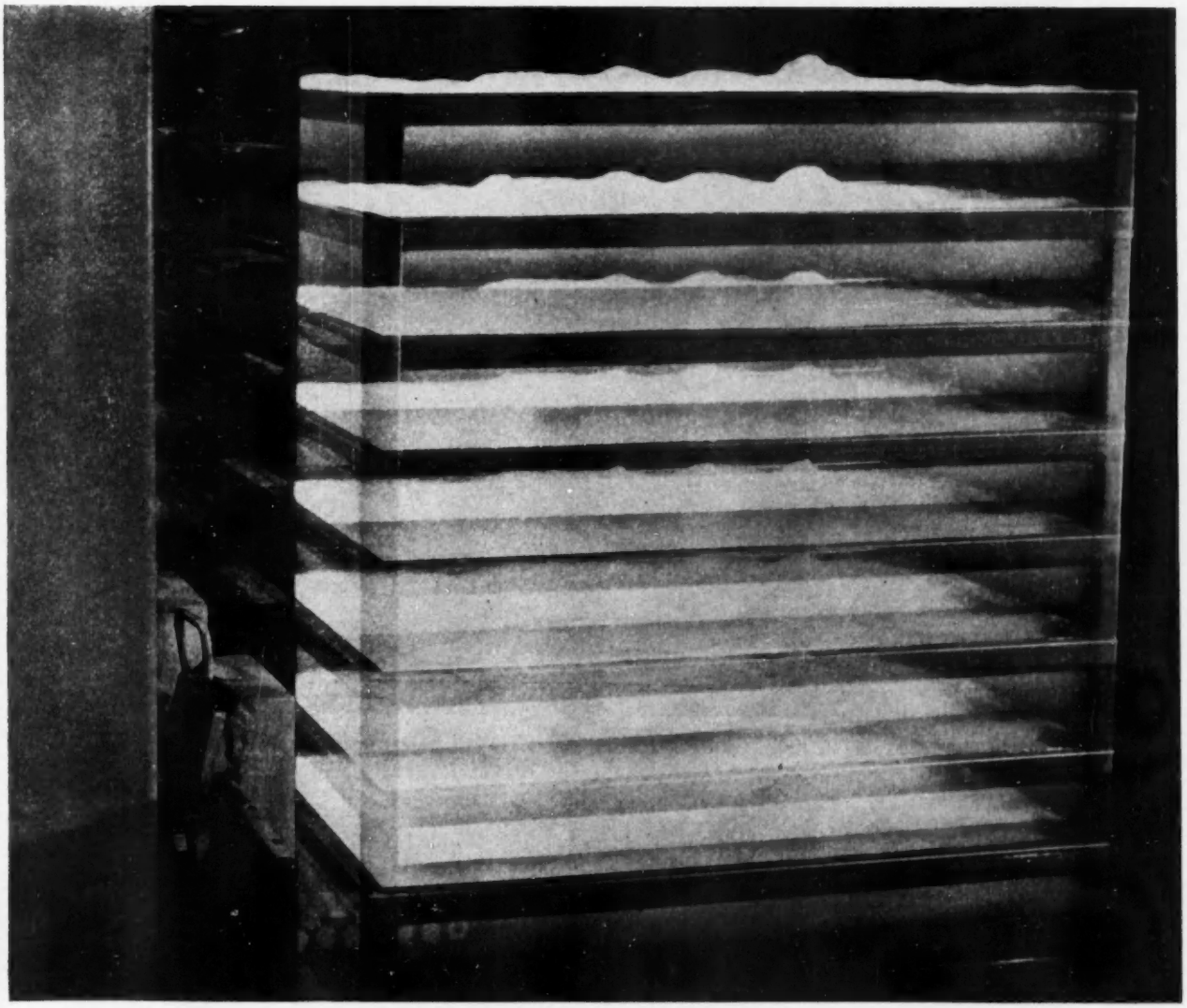
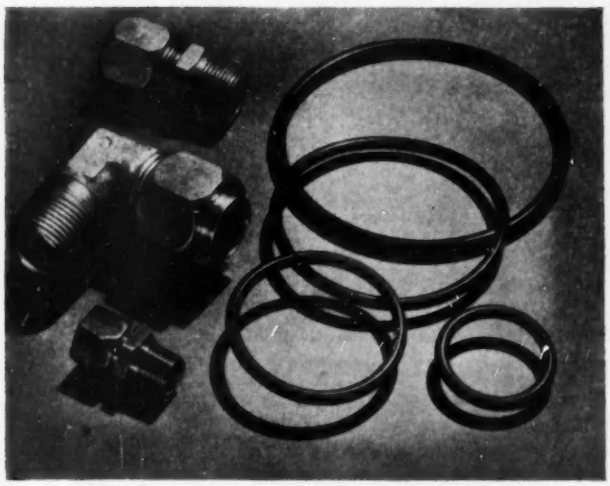
Parker
Hydraulic and fluid system components



shows tank of soapy water (suds on top) being raised without a ripple in the water line.



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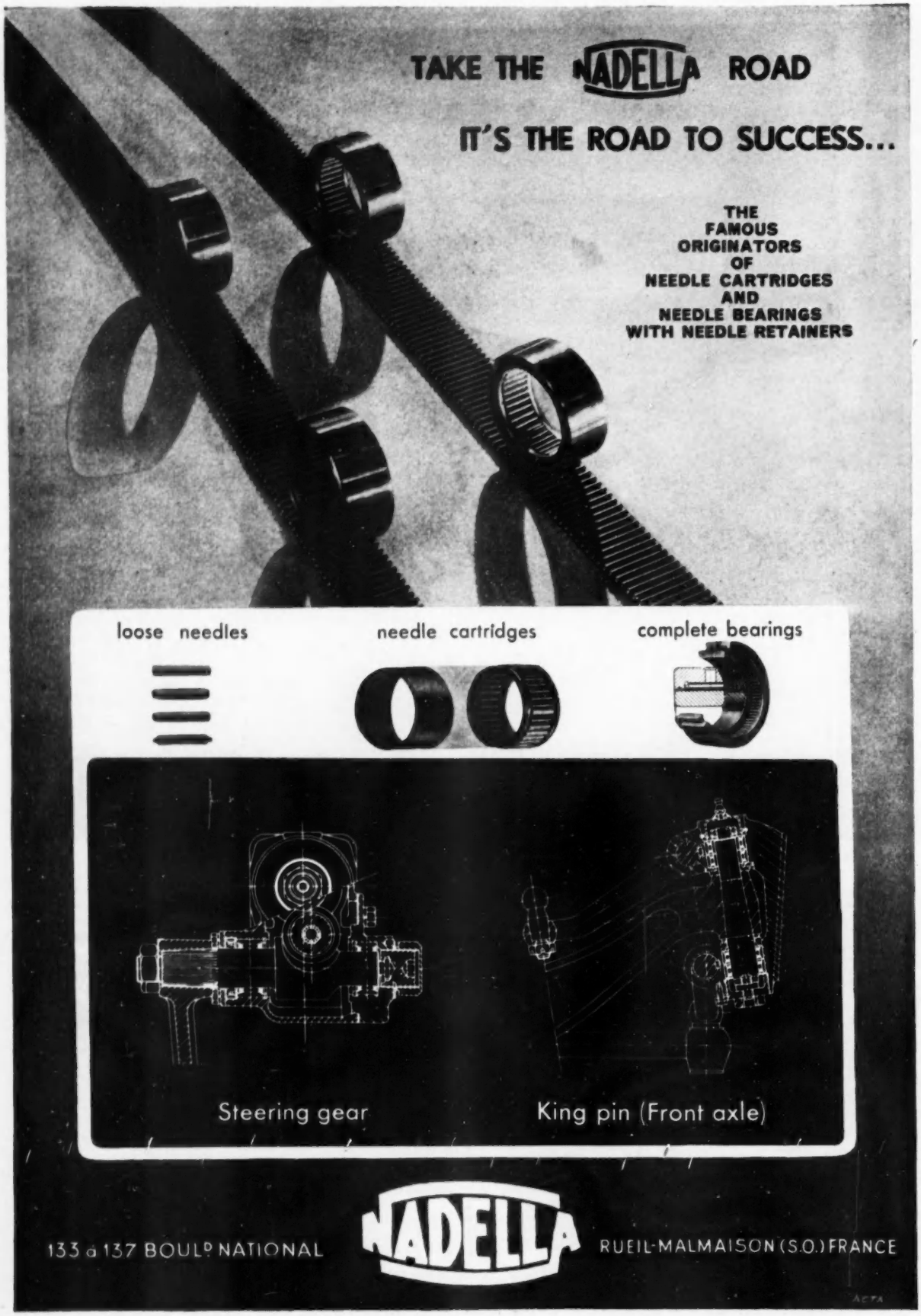
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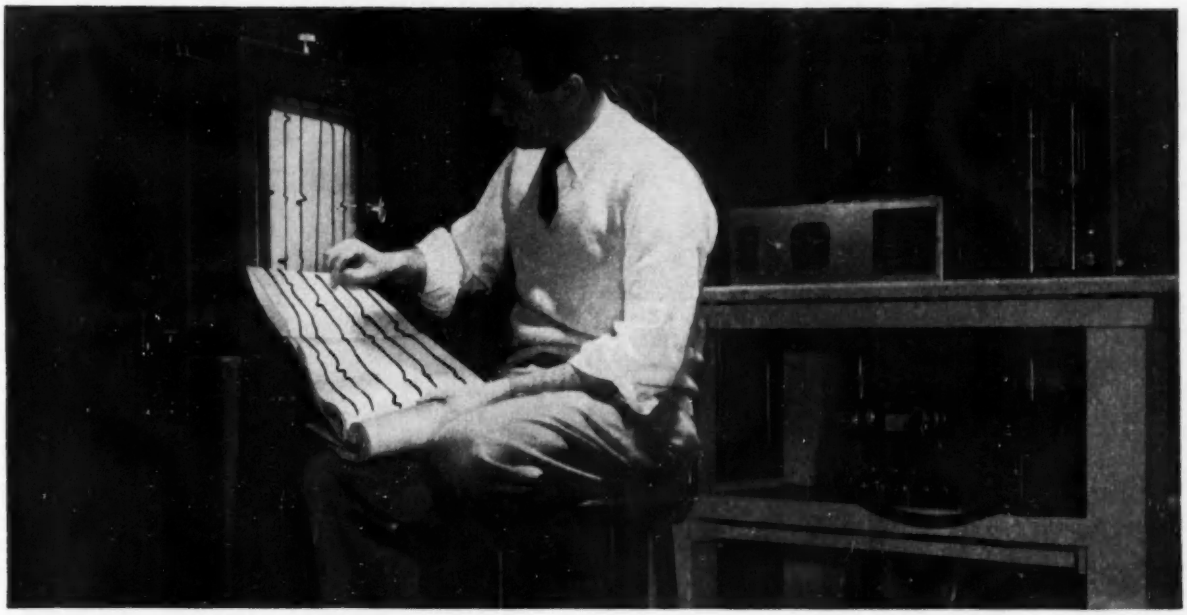
Brush six-channel magnetic oscillograph used to record output of an analog computer, which duplicates flight conditions for a jet plane. Photo courtesy Sperry Gyroscope Company.



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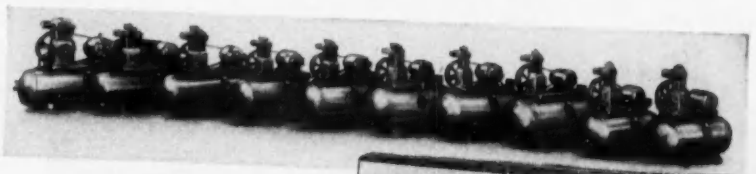

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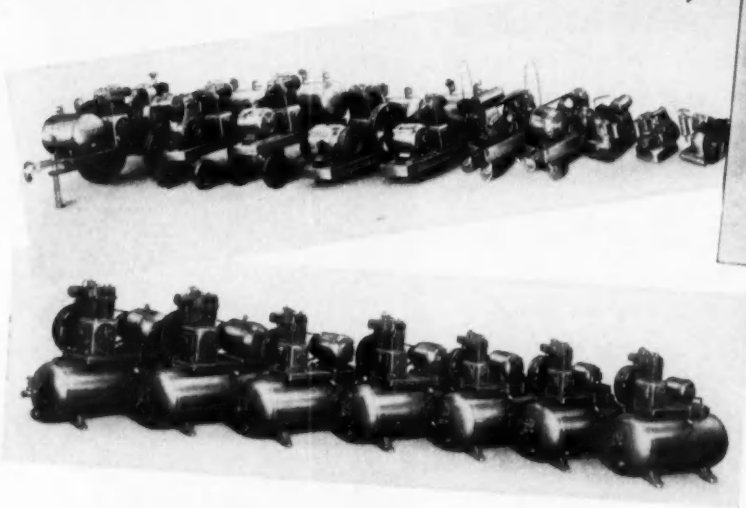

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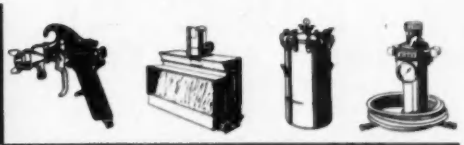

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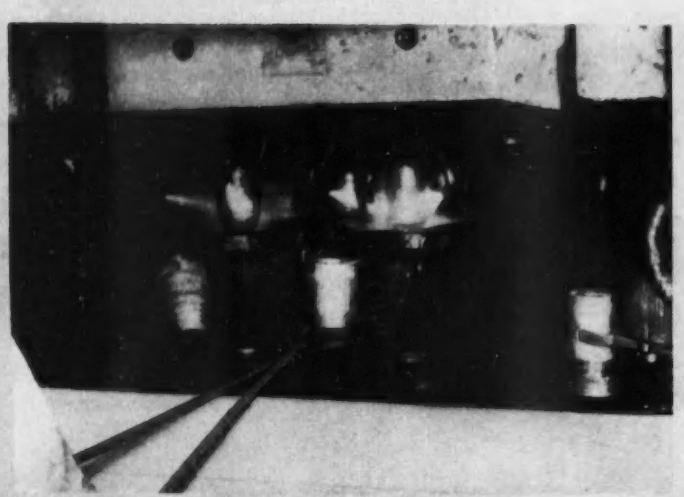


Upset slugs, heated to 2100°F., are cupped by extrusion, then shaped in forming die. High-pressure jets of mixed air and water keep punches and dies cooled to about 550°F.

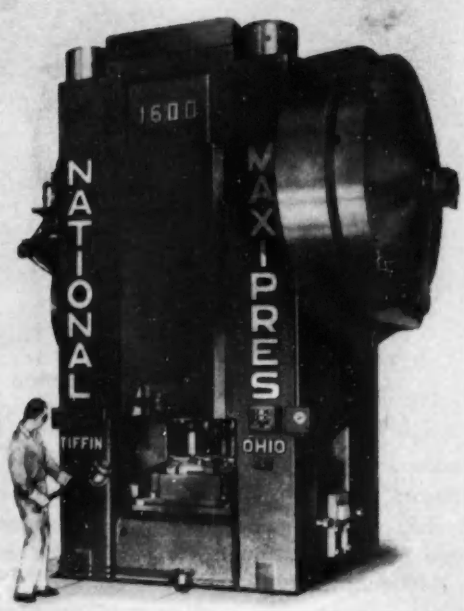
Slugs for 81-MM mortar shells are sheared from 2½ inch round bars of carbon steel. Slugs are then upset preparatory to extrusion (center illustration).

Upset slugs are extruded, then formed into cups (right).

● An outstanding production record is being established at Rheem Mfg. Co., progressive West Coast ordnance forgers, where 81-MM mortar shell blanks are being forged on a 1,600-ton National MAXIPRES at the rate of 500 blanks per hour!

Dies, developed in cooperation with NATIONAL engineers, are giving exceptionally long service. The punches have produced 14,000 to 16,000 pieces, average. After forming 15,000 cups, one die was polished, and produced another 63,000 pieces before showing much wear!

If you have a forging problem—large or small, hot or cold, ferrous or non-ferrous—let us help you solve it. Send us prints, or a sample part, or, better yet, visit us. No obligation.



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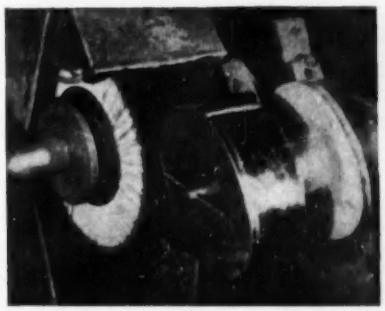

300% greater wear is obtained from the Osborn Monarch Brushes used here than with the Tampico brushes used previously. In this push-button brushing operation, a smooth lustrous finish is produced prior to nickel plating.

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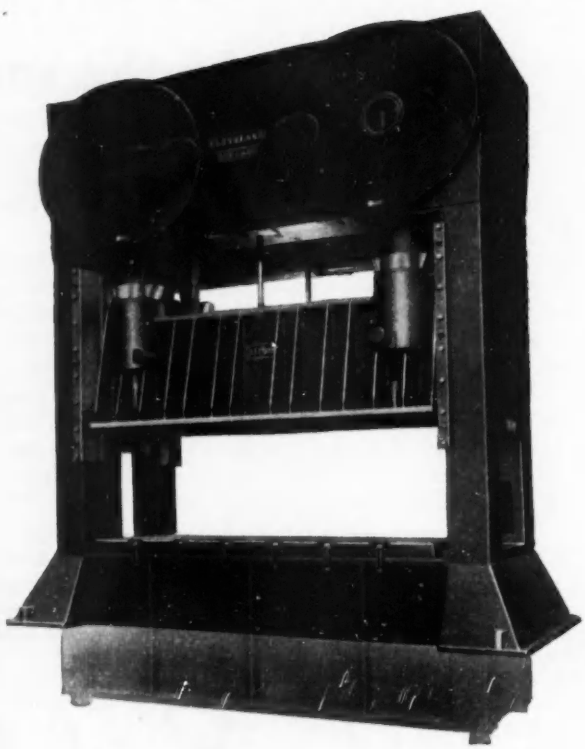

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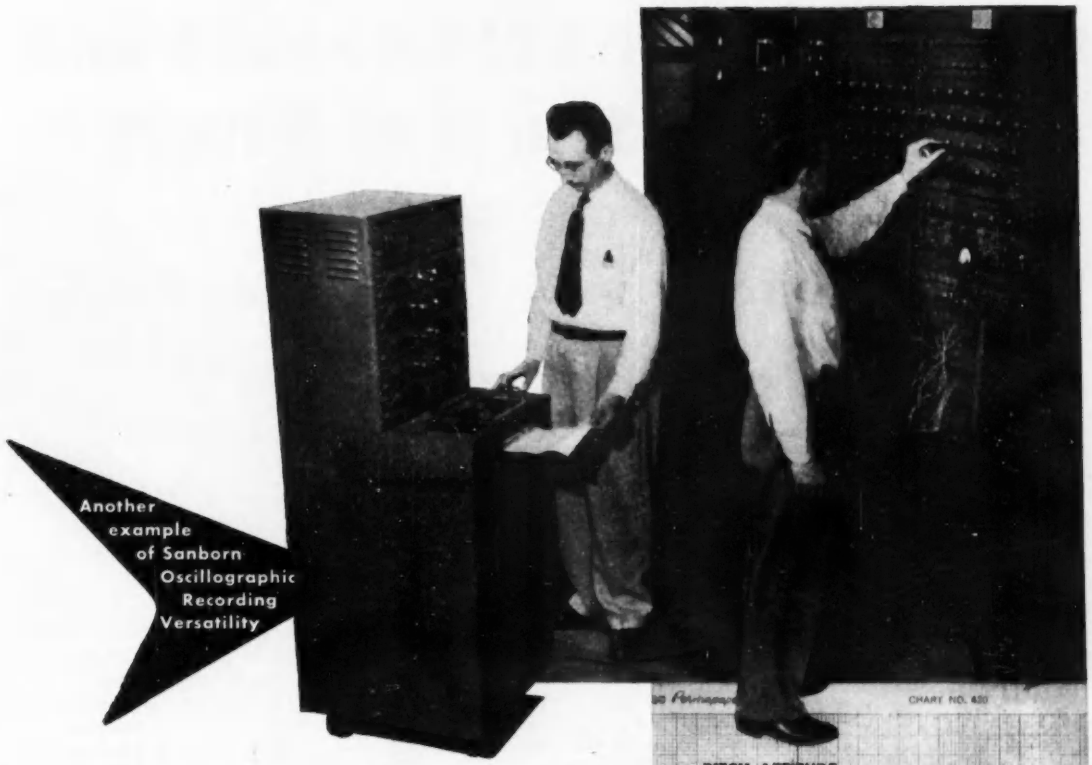
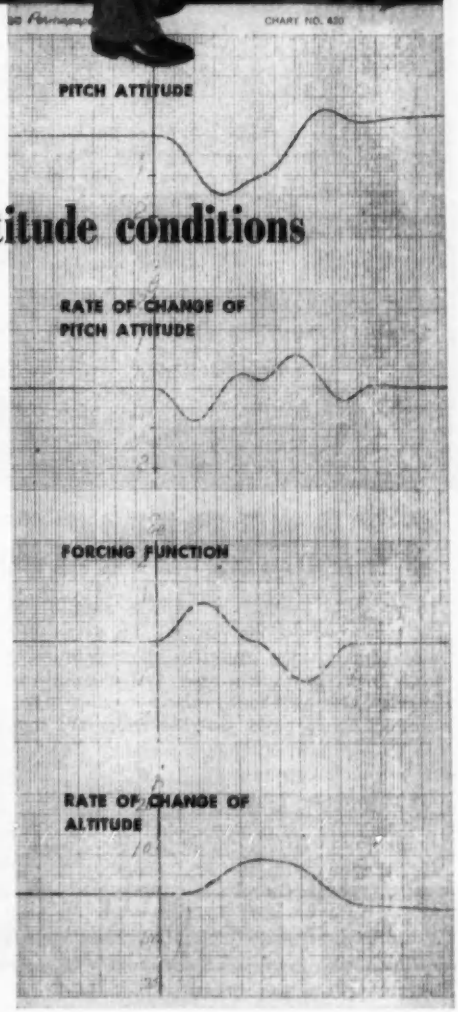


Another example of Sanborn Oscillographic Recording Versatility



Four-channel recording correlates simulated jet bomber airspeed and altitude conditions

At Eclipse-Pioneer, engineers make good use of Sanborn 4-channel recording systems in conjunction with high precision analogue computers to establish performance criteria for automatic flight systems and components.

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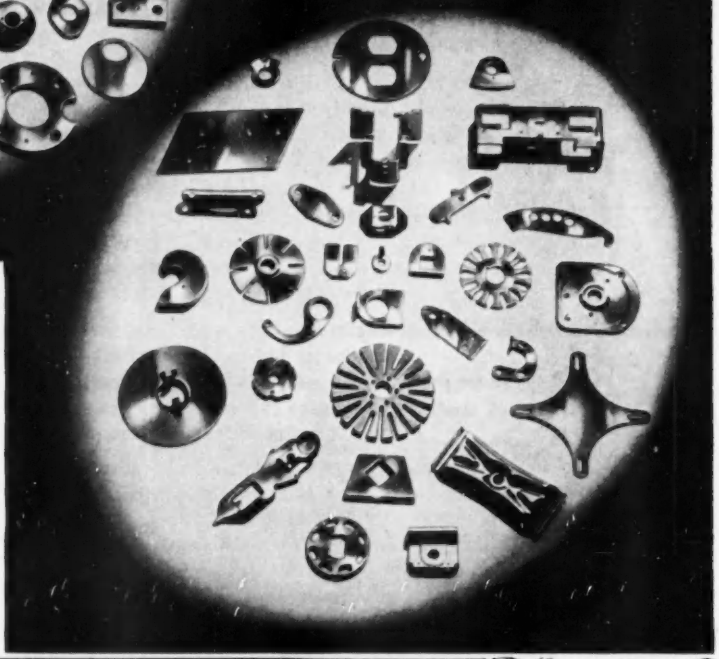

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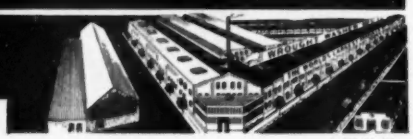

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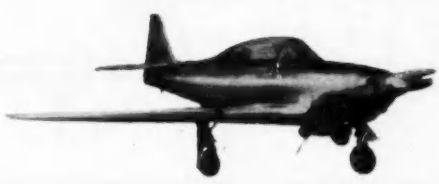
The Plebe is a two-place, low wing, tricycle landing gear trainer. Its bubble canopy gives both student and instructor unexcelled visibility. The new trainer has an exceptional rate of climb of 1350 feet per minute and plenty of power for training maneuvers with its 225-horsepower Continental military engine and full constant speed propeller.

Here is another example of how TEMCO, with remarkably little lead time, can turn out a completed aircraft of its own design . . . further proof also that TEMCO delivers a quality product on schedule . . . at lowest possible cost.



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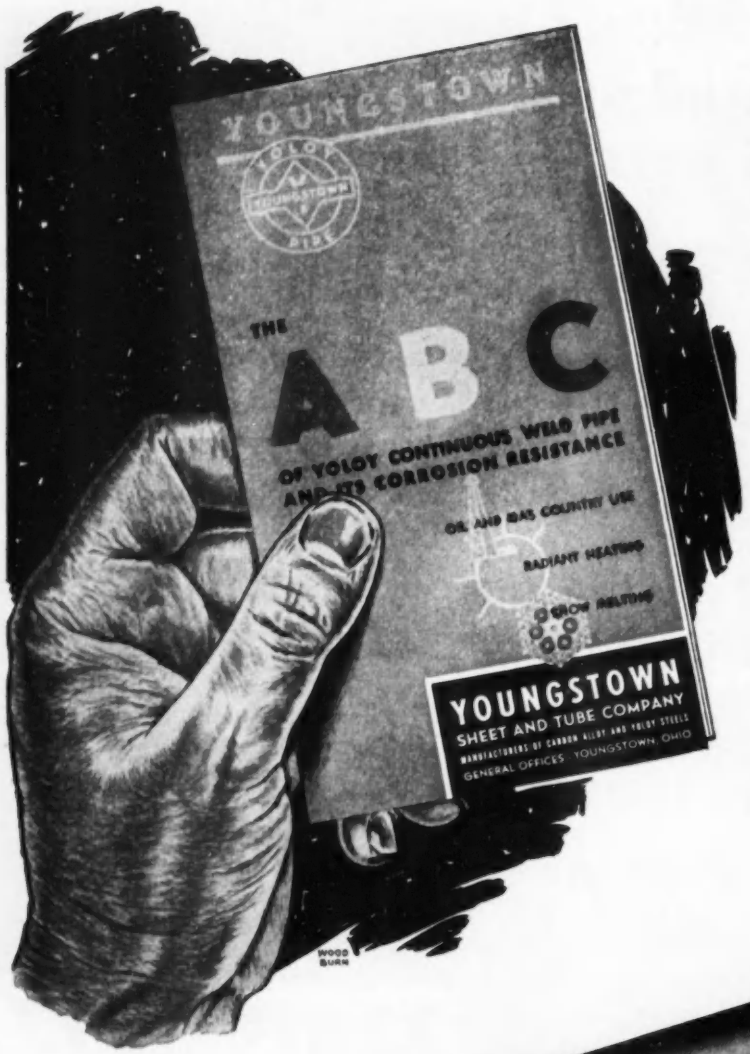

● Here is the up-to-date story of Yoloy Continuous Weld Pipe—a remarkable low alloy steel whose nickel-copper content gives it unique ability to withstand corrosion, abrasion and shock. These outstanding advantages combined with high strength, ductility and weldability make Yoloy Pipe an excellent selection.

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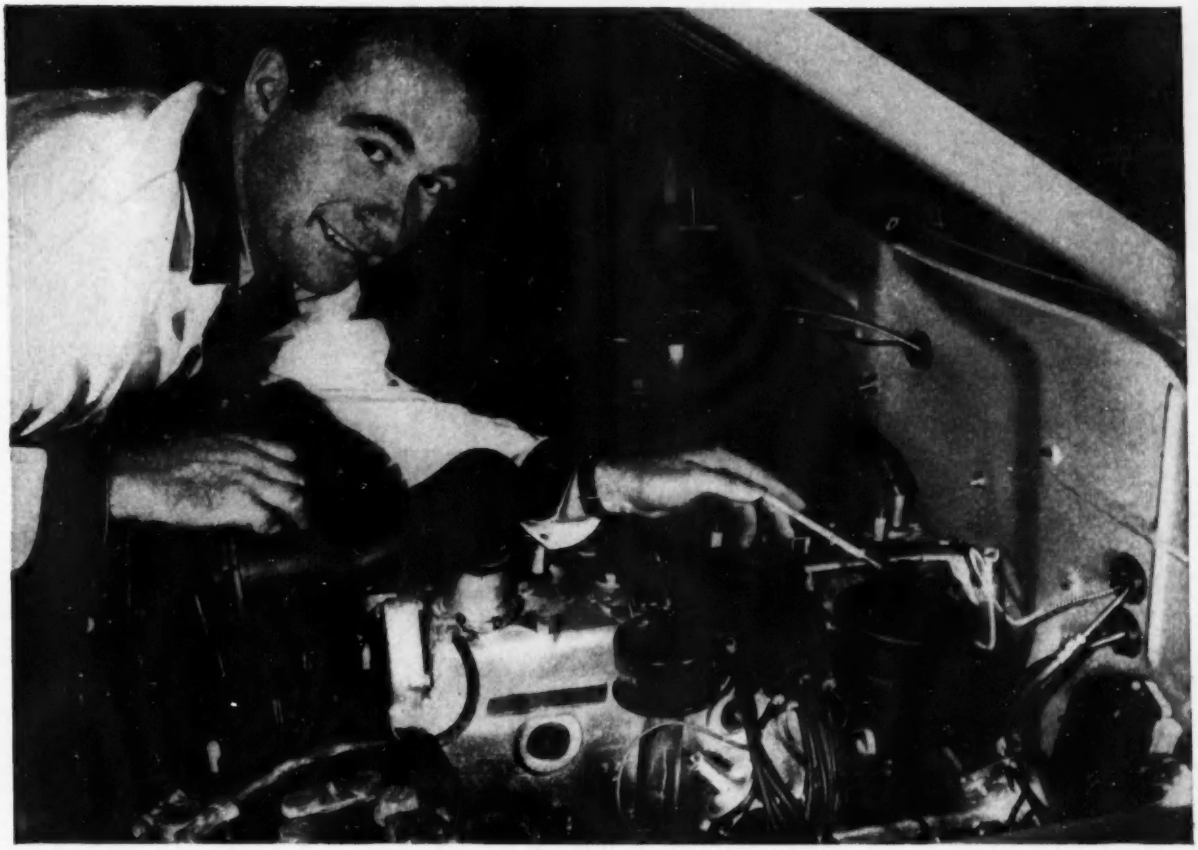


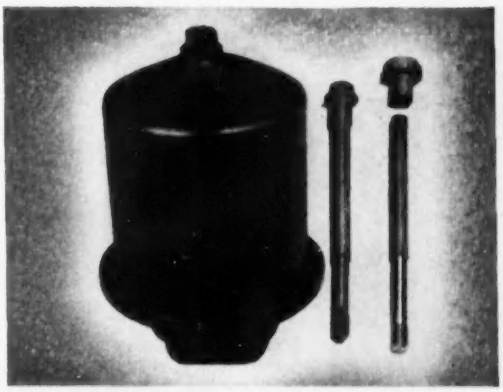
Here's where Purolator screened out rising costs

● Purolator makes oil filters for a prominent auto maker. They're top-notch filters that do a tough job well. Purolator and the car manufacturer are both proud of them.

Not long ago an RB&W "fastener engineer" got loose in the Purolator plant—just when company production executives were looking for a way to lick rising costs. He noticed that the Purolator filter was being assembled with a two-piece fastener made slowly and laboriously on a screw machine.

Our man told the Purolator people about RB&W's batteries of cold-forming machines. Purolator wanted to know more. Now their filter is assembled with a one-piece RB&W fastener that costs far less to make and assemble.

Chances are you can find a stage in your operations where RB&W "fastener engineering" can help you keep costs in line. As a leading manufacturer of all kinds of fasteners, we're always able to recommend and supply the right ones for all your needs. Write RUSSELL, BURDSALL & WARD BOLT AND NUT COMPANY, Port Chester, N. Y.



EASIER, FASTER ASSEMBLY undercut high costs when Purolator switched from a two-piece fastener *(right)* to an RB&W-designed cold-formed fastener *(left)* for its famous oil filter.

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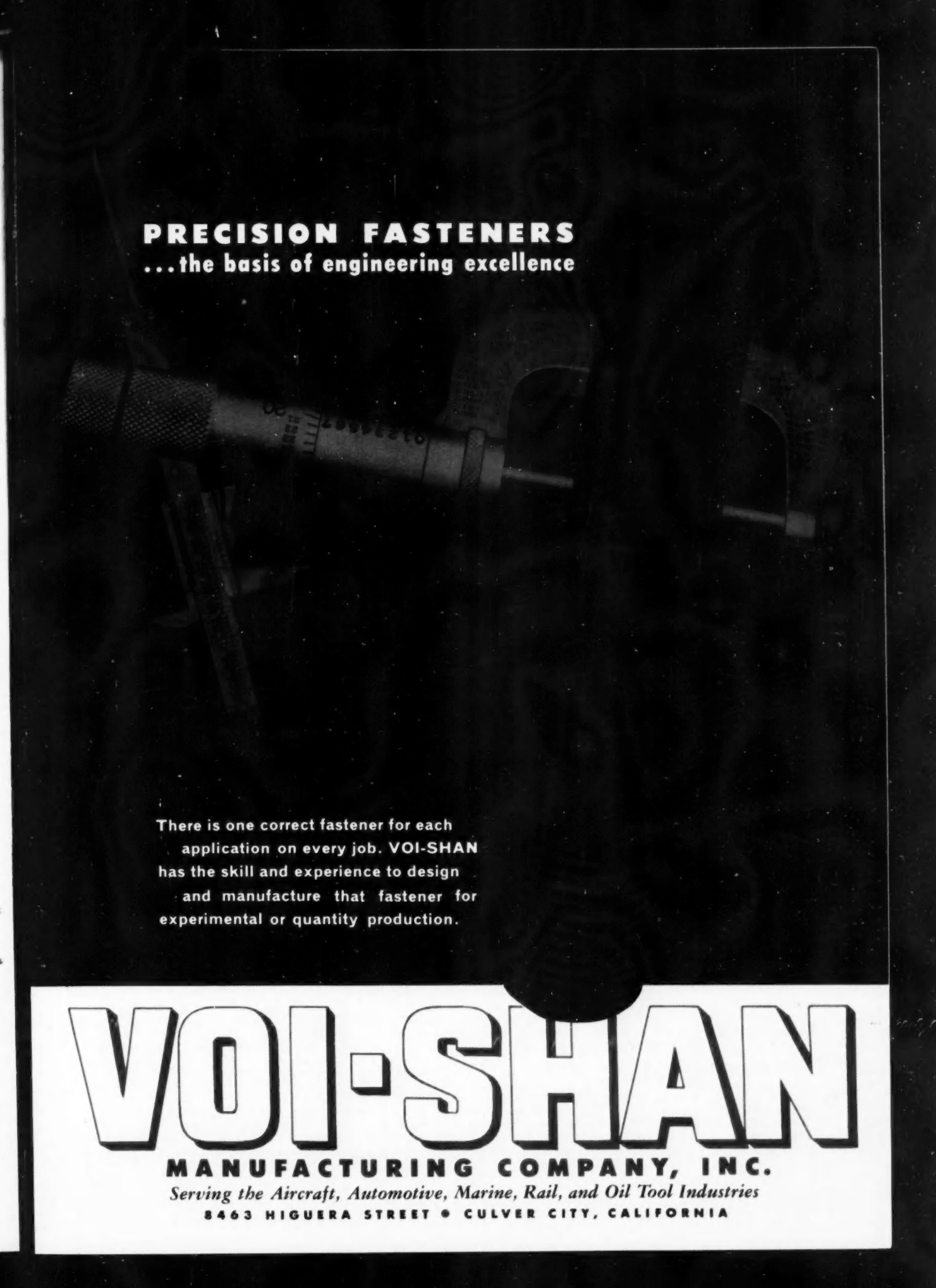

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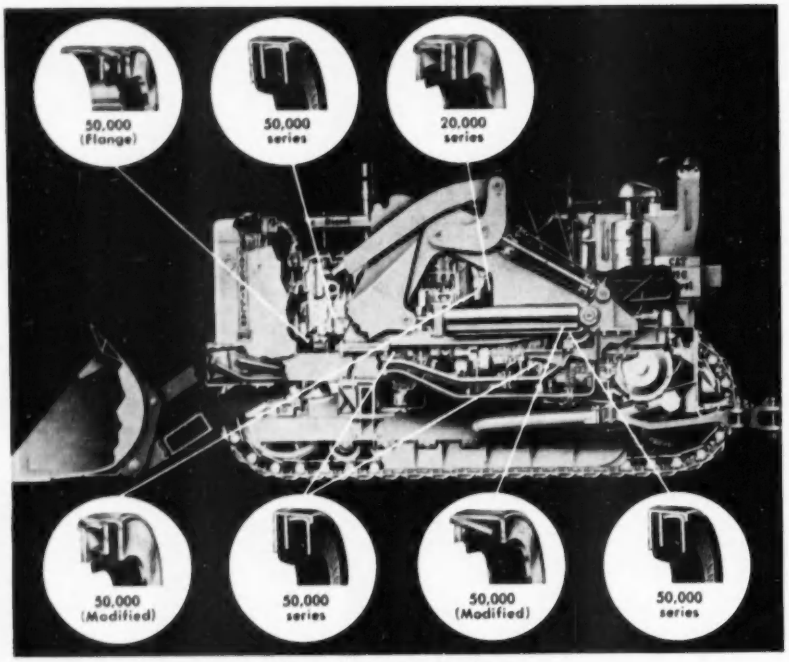


Figure 1. Caterpillar No. 6 Shovel

National Oil Seals used at key points throughout new Caterpillar No. 6 Shovel

The Caterpillar No. 6 Shovel is a 66 hp heavy-duty unit of two-yard capacity, with a non-oscillating track frame. As in other Caterpillar equipment, National Oil Seals are installed at key points to retain lubricant, exclude dirt and water, and prolong life of bearings and assemblies.

Among the many positions where National seals are installed is the front crankshaft bearing. Here a National 50,000 series seal with a special, press-fit mounting sleeve is employed. This seal is of single-lip design, and has an accurately spring-tensioned leather sealing member to retain crankcase oil.

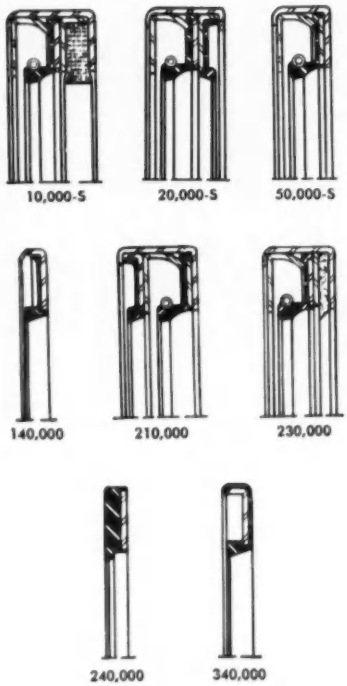
On the fuel pump shaft, Caterpillar also uses a National 50,000 seal with a spring-tensioned leather sealing lip. On the starting engine crankshaft (rear) a National 20,000 series seal is used. This is a dual-lip seal, employing a leather main sealing lip to retain lubricant and a springless leather auxiliary lip as a dust excluder.

At other vital positions, including the starting engine crankshaft (front), track carrier rollers, the upper transmission shaft, gear shifter shaft and shaft housing, modified or standard-design National 50,000 series leather seals are employed. National precision shims are also utilized extensively in the shovel, and National O-Rings are used in the steering clutch control and dump control assemblies.

National seals used in the Caterpillar No. 6 Shovel are all basic designs or modifications. National offers over 2,500 standard-design seals; can also provide special seals for special requirements. Your National Field Applications Engineer has complete information.

*T. M. Reg.

National Syntech* Oil Seals are widely used for operation in applications where intermittent temperatures reach 250° F, speeds reach 3,600 F.P.M., and total indicator runout reaches .030. Basic designs shown here employ tough, accurately manufactured steel outer cases, precision-tensioned springs and accurately molded and trimmed Syntech sealing lips unaffected by water, most lubricants, detergents or industrial fluids.



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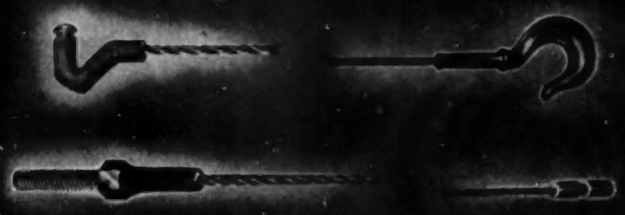

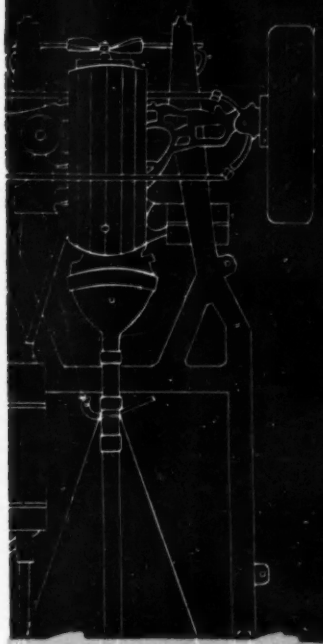

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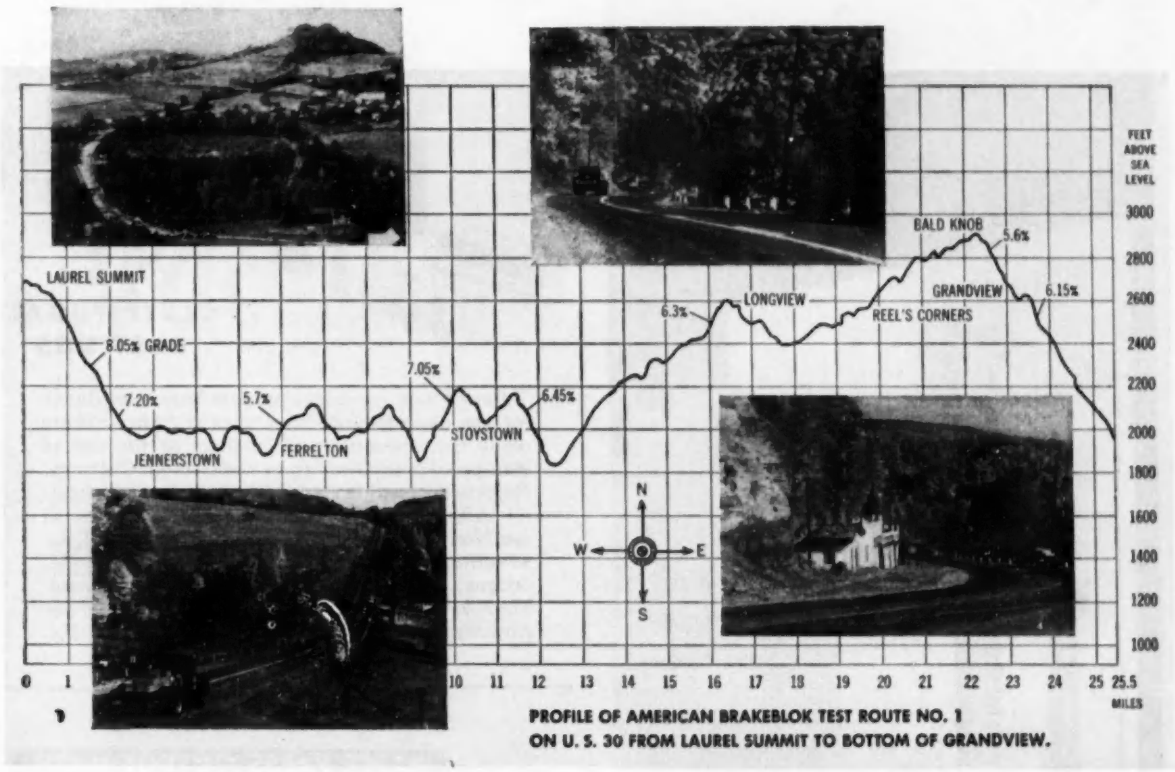

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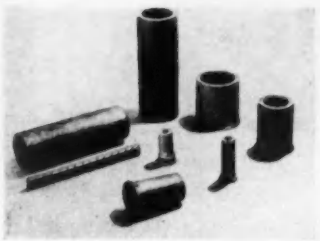

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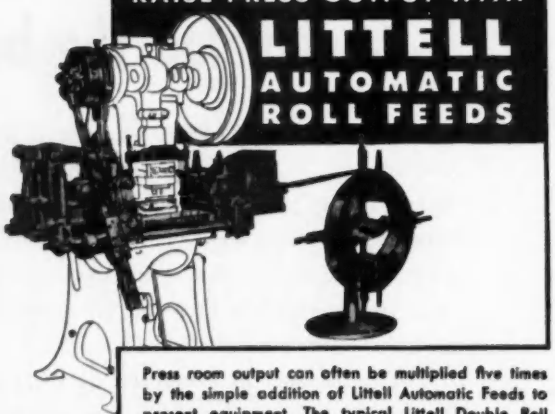

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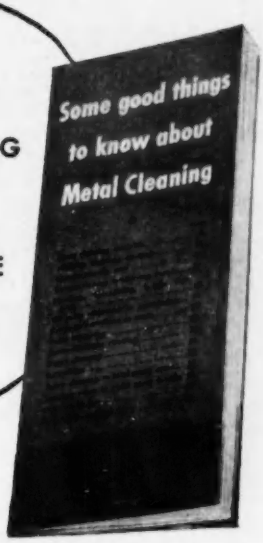

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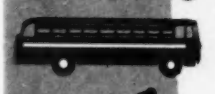

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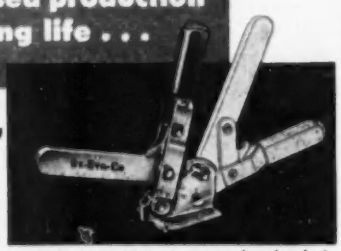

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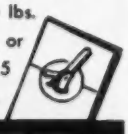

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Illustrated above are a few of the many forms that can be produced efficiently on the Multiform Bender.

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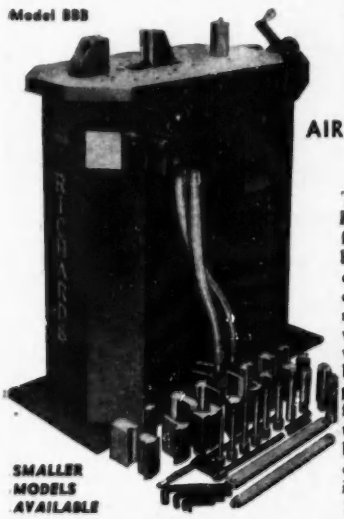

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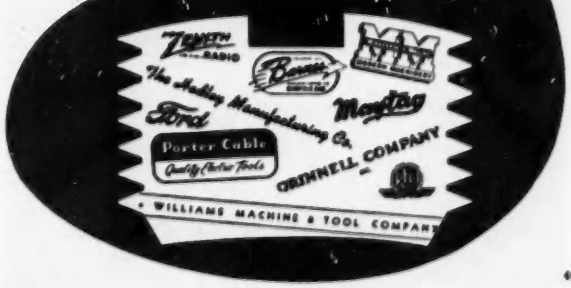

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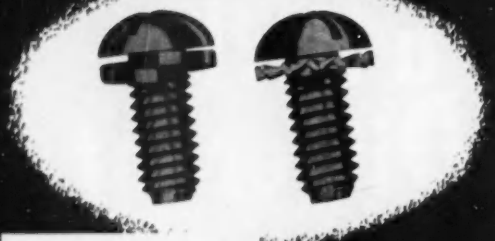

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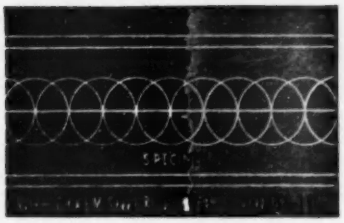

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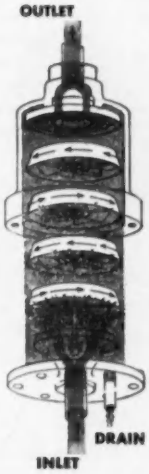

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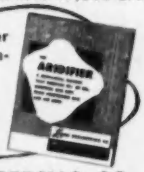

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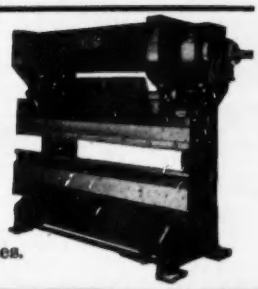

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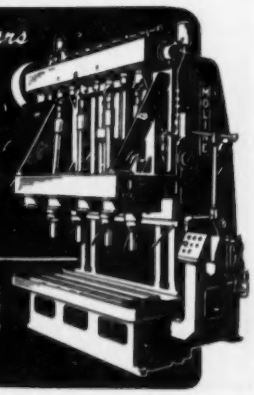

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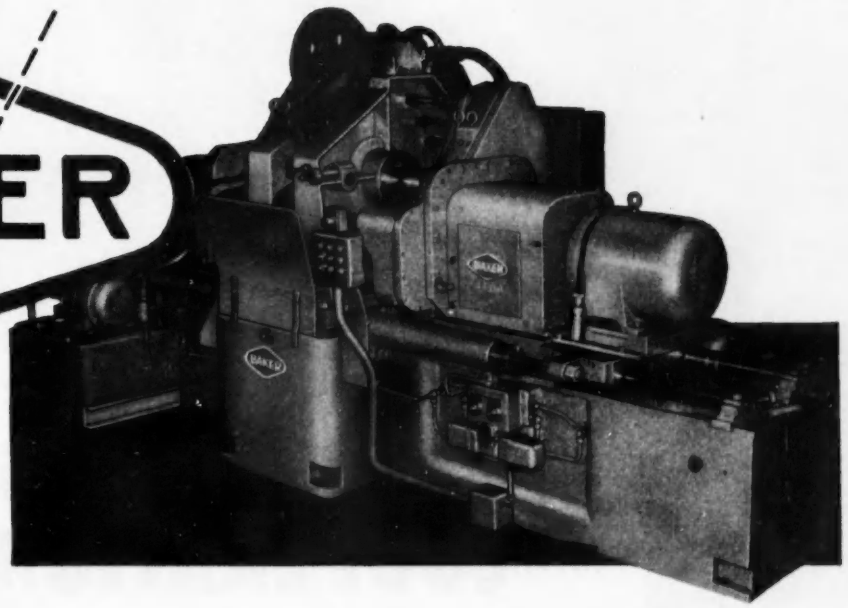
Modern Machine Tools..

SLASH PRODUCTION COSTS!

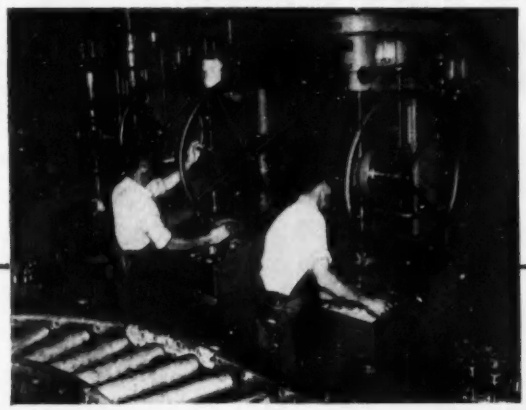
New
BAKER
Method



1 Operator . . .
1 Machine . . .

Multi-Operations Fully Automatic On 4 Parts Simultaneously—Load—Drill—Core Drill—Ream—Unload

THE OLD METHOD —



2 OPERATORS . . 4 MACHINES . .

Hand Controls + Excessive Handling + Capstan And Hand Engagement Of Feed + Operator Fatigue = Low Production Rate At High Cost.

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DRILLING...TAPPING...KEYSEATING and CONTOUR GRINDING MACHINES

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ENGINEERING
COOPERATION
THAT DEVELOPS
FINER ENGINES*
Over 70% of all makes
of heavy duty engines
(gasoline and diesel)
are Zollner Piston equipped
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TIGHT

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The Washer That Has The Edge

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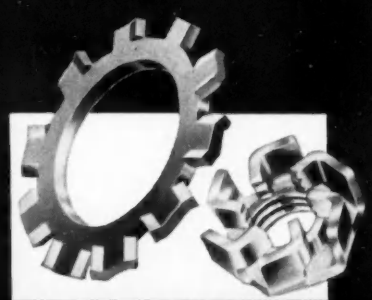

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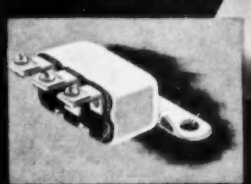
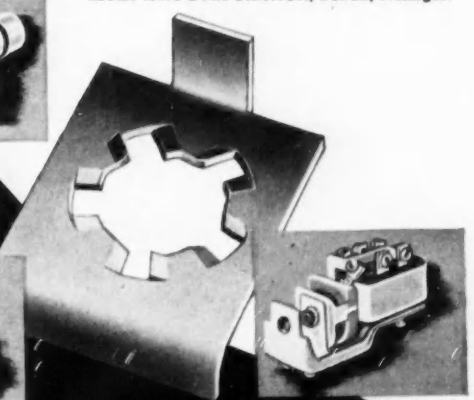
R-B-M Foot Dimmer Switch



R-B-M Horn Relay



R-B-M Headlamp Switch

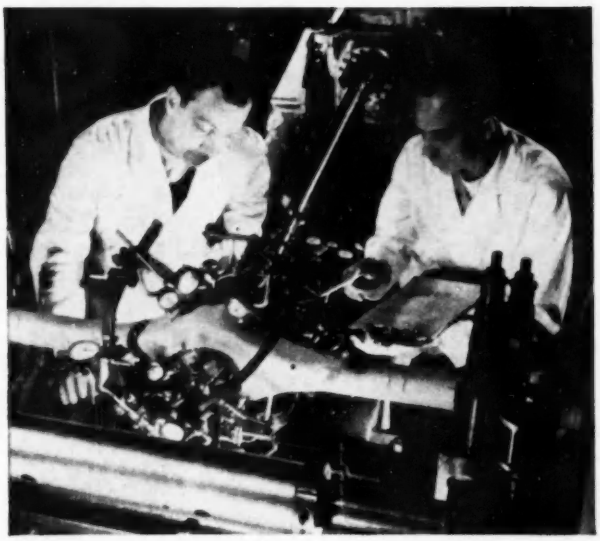
"EVERLOCK" IS THE REGISTERED TRADEMARK OF THOMPSON-BREMER & COMPANY

• 520 N. DEARBORN STREET, CHICAGO 10, ILLINOIS

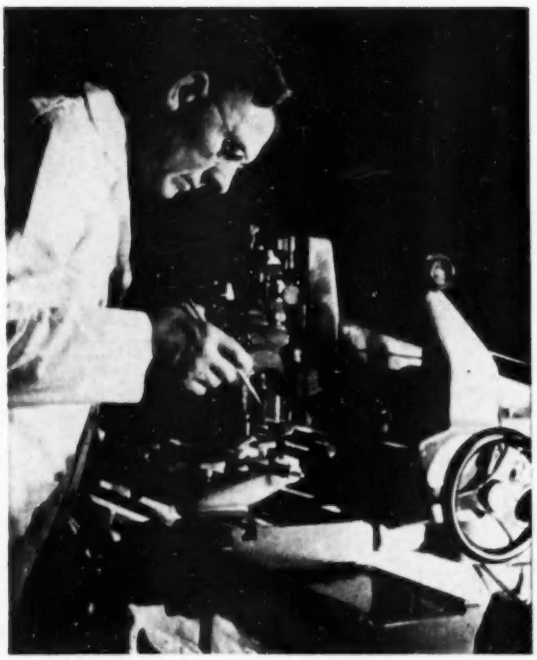
SUBSIDIARY OF AMERICAN MACHINE AND FOUNDRY COMPANY • NEW YORK, N. Y.

There's safety in numbers like this

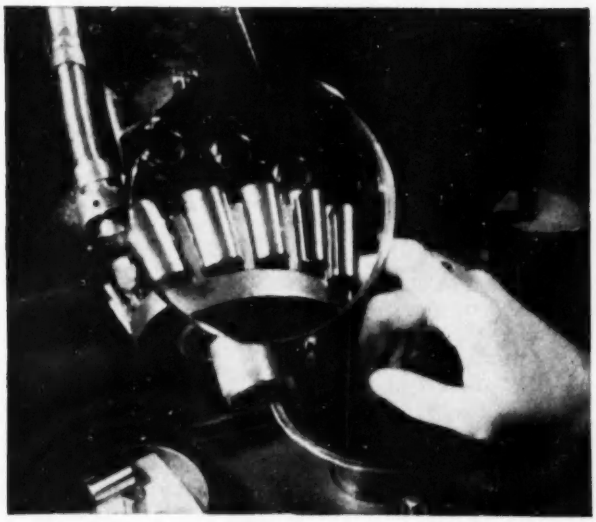
WHEN YOU SEE the number HM89410 on the cup—and HM89446 on the cone—it's safe to assume that the tapered roller bearing is a size often used on pinions. But you're a whole lot safer with the "Timken"® trade-mark beside the number. That means you're getting *extra* quality and services.



MOST CAR MANUFACTURERS use this service: We test their transmissions and axles to catch excessive axle deflection in the design stage. Customers then get written reports with recommendations for stiffening housings or shafts, changing to other sized bearings, etc. We offer many engineering aids like this to our bearing customers.



WE MAKE CHECKS IN 3D with this universal measuring machine. It measures the length, width and depth of machine and gage parts. Accurate to fifty millionths, it's another example of how far we go to put precision in our bearings—to help make them the number 1 value for your car's moving parts—the vital zone.



WE PUT EVERY ROLLER under a magnifying glass to search for surface flaws. It's one of many inspections that helps assure that *every* Timken bearing has the *same* high quality. Always specify "Timken" with the bearing number. And for *full* value, always use a Timken bearing cup with a Timken bearing cone. The Timken Roller Bearing Company, Canton 6, Ohio.

TIMKEN is number 1 for VALUE where value counts most . . . in the vital zone

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